Help

Basic Search | Advanced Search | Topic Guide | Publication Search | Marked List : 0 articles | Interface language: English

Databases selected: Multiple databases...

Results

- **3** articles found for: *"base networking system"*

All sources

Mark / Clear all on page | View marked articles | Full text articles only | Sort results by: Most recent articles first

1. **Tengtu International and Chinese Partners Win Contract for World's Largest e-Education System**
   Business/Education Editors. **Business Wire.** New York: Jun 26, 2001. p. 1
   Full text | Abstract

2. **Discovery Acquisitions Inc. - Health Canada - Manitoba Region to Use MRX Software**
   Canada NewsWire. Ottawa: Dec 18, 2000. p. 1
   Full text | Abstract

3. **Discovery Acquisitions Inc. - Subsidiary Enters Into License Agreement For MRX Software**
   Canada NewsWire. Ottawa: Oct 12, 2000. p. 1
   Full text | Abstract

1-3 of 3

Results per page: 10

Basic Search

Tools: Search Tips | Browse Topics | 2 Recent Searches

"base networking system" [Search] [Clear]

Database: Multiple databases... | Select multiple databases

Date range: All dates

Limit results to: ☑ Full text articles only

☐ Scholarly journals, including peer-reviewed | About

More Search Options

Text-only interface

From:ProQuest

Help

Basic Search | Advanced Search | Topic Guide | Publication Search | Marked List : 0 articles | Interface language: English

Databases selected: Multiple databases...

Searching for abns and (train? or locomotive? or railroad?) did not find any articles. These tips can help:

- Check your spelling.
- Reduce the number of terms included in your search.
- Broaden your search by selecting other databases, removing limits, or searching "Citations and Article Text" (see More Search Options.)
- Connect similar terms with the "OR" operator (e.g. military OR pentagon). See Search Tips for more hints.

Basic Search

Tools: Search Tips | Browse Topics | 3 Recent Searches

abns and (train? or locomotive? or railroad?) | Search | Clear

Database: Multiple databases... | Select multiple databases

Date range: All dates

Limit results to: ☑ Full text articles only

☐ Scholarly journals, including peer-reviewed | About

More Search Options

Text-only interface

From:ProQuest

Help

Basic Search Advanced Search Topic Guide Publication Search Marked List : 0 articles Interface language: English

Databases selected: Multiple databases...

Searching for amci nexterna did not find any articles. These tips can help:

- Check your spelling.
- Reduce the number of terms included in your search.
- Broaden your search by selecting other databases, removing limits, or searching "Citations and Article Text" (see More Search Options.)
- Connect similar terms with the "OR" operator (e.g. military OR pentagon). See Search Tips for more hints.

Basic Search

Tools: Search Tips Browse Topics 5 Recent Searches

amci nexterna Search Clear

Database: Multiple databases... Select multiple databases

Date range: All dates

Limit results to: ☑ Full text articles only

☐ Scholarly journals, including peer-reviewed About

More Search Options

Text-only interface

From:ProQuest

```
?s (amci or (automated()monitoring)(1w)(control()international) or nexterna)(100n)(base
()network???)

Your SELECT statement is:
   s (amci or (automated()monitoring)(1w)(control()international) or
nexterna)(100n)(base()network???)

              Items    File
              -----    ----
        Examined  50 files
        Examined 100 files
        Examined 150 files
        Examined 200 files
        Examined 250 files
        Examined 300 files
        Examined 350 files
        Examined 400 files
Processing
                 1    654: US Pat.Full._1976-2004/Feb 10
        Examined 450 files
        Examined 500 files
        Examined 550 files

   1 file has one or more items; file list includes 556 files.

?
```

```
s abns(100n)(train? ? or locomotive? ? or railroad? ?)

Your SELECT statement is:
   s abns(100n)(train? ? or locomotive? ? or railroad? ?)

           Items    File
           -----    ----
               1     47: Gale Group Magazine DB(TM)_1959-2004/Feb 12
       Examined  50 files
               1     88: Gale Group Business A.R.T.S._1976-2004/Feb 13
       Examined 100 files
               1    148: Gale Group Trade & Industry DB_1976-2004/Feb 13
       Examined 150 files
       Examined 200 files
       Examined 250 files
       Examined 300 files
       Examined 350 files
       Examined 400 files
               1    654: US Pat.Full._1976-2004/Feb 10
       Examined 450 files
       Examined 500 files
       Examined 550 files

   4 files have one or more items; file list includes 556 files.

?
```

File 47:Gale Group Magazine DB(TM) 1959-2004/Feb 12
(c) 2004 The Gale group
File 88:Gale Group Business A.R.T.S. 1976-2004/Feb 13
(c) 2004 The Gale Group
File 148:Gale Group Trade & Industry DB 1976-2004/Feb 13
(c)2004 The Gale Group
File 654:US Pat.Full. 1976-2004/Feb 10
(c) Format only 2004 The Dialog Corp.

Set	Items	Description
S1	4	ABNS(100N)(TRAIN? ? OR LOCOMOTIVE? ? OR RAILROAD? ?)

1/3,K/1 (Item 1 from file: 47)
DIALOG(R)File 47:Gale Group Magazine DB(TM)

04282008 SUPPLIER NUMBER: 17163076 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Bumpy landing in Windy City. (1995 American Booksellers Association convention in Chicago, Illinois)(includes related information)(ABA '95)
Publishers Weekly, v242, n26, p46(4)
June 26, 1995
ISSN: 0000-0019 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 1620 LINE COUNT: 00135

... seemed like a bargain in comparison.
Deluged with criticism during the show-- especially at the **ABNs** Sunday town meeting--representatives of AES scrambled to solve some of the problems. AES called...

...bus lanes; the food-vending company was asked to put out more food; information about **trains** was disseminated. By Sunday and Monday, traffic flow had improved greatly. AES and the ABA...

1/3,K/2 (Item 1 from file: 88)
DIALOG(R)File 88:Gale Group Business A.R.T.S.

03640226 SUPPLIER NUMBER: 17163076
Bumpy landing in Windy City. (1995 American Booksellers Association convention in Chicago, Illinois)(includes related information)(ABA '95)
Publishers Weekly, v242, n26, p46(4)
June 26, 1995
ISSN: 0000-0019 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 1602 LINE COUNT: 00132

... seemed like a bargain in comparison.
Deluged with criticism during the show-- especially at the **ABNs** Sunday town meeting--representatives of AES scrambled to solve some of the problems. AES called...

...bus lanes; the food-vending company was asked to put out more food; information about **trains** was disseminated. By Sunday and Monday, traffic flow had improved greatly. AES and the ABA...

1/3,K/3 (Item 1 from file: 148)
DIALOG(R)File 148:Gale Group Trade & Industry DB

07977568 SUPPLIER NUMBER: 17163076 (USE FORMAT 7 OR 9 FOR FULL TEXT)
Bumpy landing in Windy City. (1995 American Booksellers Association convention in Chicago, Illinois)(includes related information)(ABA '95)
Publishers Weekly, v242, n26, p46(4)
June 26, 1995
ISSN: 0000-0019 LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 1620 LINE COUNT: 00135

... seemed like a bargain in comparison.
Deluged with criticism during the show-- especially at the **ABNs** Sunday town meeting--representatives of AES scrambled to solve some of the problems. AES called...

...bus lanes; the food-vending company was asked to put out more food; information about **trains** was disseminated. By Sunday and Monday, traffic flow had improved greatly. AES and the ABA...

1/3,K/4 (Item 1 from file: 654)
DIALOG(R)File 654:US Pat.Full.

4017031 **IMAGE Available
Derwent Accession: 1998-436782
Utility
REASSIGNED
E/ **Apparatus and method for tracking reporting and recording equipment inventory on a locomotive**
Inventor: Neeson, Michael J., Omaha, NE
Furman, Edward L., Omaha, NE
Assignee: Automated Monitoring and Control International, Inc. (02), Omaha, NE
Automated Monitoring and Control International Inc
Examiner: Teska, Kevin J. (Art Unit: 234)
Assistant Examiner: Nguyen, Tan
Combined Principal Attorneys: Beehner, John A.

	Publication Number	Kind	Date	Application Number	Filing Date
Main Patent	US 5786998	A	19980728	US 95445528	19950522

Fulltext Word Count: 13564

Summary of the Invention:

...a communications system which is capable of transmitting information regarding on-board equipment on a **locomotive** to a remote location without requiring installation of space-consuming equipment on the locomotive...

...a communications system for railroads for communication between a dispatcher and field units such as **locomotives** , rubber tire vehicles, trackside equipment and yard and terminal operations, in which the data being communicated consists of **train** control, location and speed monitoring, track warrants and bulletins and work order reporting. **ABNS** communicates via a software-based system which resides in a front end processor located at computer control headquarters and is based on the ATCS (Advanced **Train** Control System) standard. **ABNS** communicates with various field units through a plurality of base stations located alongside tracks throughout the **railroad** system. The base stations are radio transmitter/receivers which enable real-time communications between the...

...In **ABNS** , communications with **locomotives** is initiated through the base stations, which are in contact with mobile communications packages (MCP) on board the **locomotives** . The MCP may be operatively connected to one or more on-board intelligent devices on the **locomotives** such as an on-board computer, so that information such as work order reports may...

...place which provides for real-time communications between the on-board intelligent devices of a **locomotive** and a dispatcher or **railroad** employee at the central computer location. However, while **ABNS** presently provides such applications as work order reporting and location monitoring, **ABNS** does not provide any sort of equipment inventory tracking, reporting and recording system, and with the growth and complexity of the equipment on board **locomotives** , there is increasingly a need for such a system. Of course, it is to be...any device having the ability to communicate over the local communications network on-board the **locomotive** , specifically, that the device have the ability to receive and understand a Query for Health...

Description of the Invention:

...between a dispatcher 32 or a customer 34 and MCP-equipped field units such as **locomotives** 38, rubber-tired vehicles 40, trackside equipment 42 and yard and terminal operations 44. The...

...of Nebraska and is referred to in this description as the AMCI Base Networking System (**ABNS**). **ABNS** includes as a central feature the

front end processor (FEP) 46 which includes much of...

...miniframe computer such as those designed by the Tandem Corporation of California. Of course, the **ABNS** could be implemented in a UNIX environment or even in a distributed network of personal...

...databases which include information regarding the location of the various field units 36 in the **ABNS** system. One of the more important and useful databases is formed by the **locomotive** monitor or LMON process within the FEP 46. This process tracks the location of **locomotives** in the rail environment and stores the location information in an easily accessable database for use by other procedures. The front end processor 46 is most commonly physically located at **railroad** headquarters. Both the dispatcher 32 and customer service representative 35 operate through systems designed to...maintain radio contact with the field unit 36 via SSI (the signal strength indicator in **ABNS**) which compares the signal strength of the incoming signal to a full strength signal to...

...Finally, in the base networking system shown in FIG. 2, communications with foreign **railroads** 58 and with the **locomotive** shop or car repair shop 60 may also be maintained through the front end processor...been out of contact for more than its Max-Out-of-Contact time. When a **locomotive** becomes non-operational, alarms and notices are generated to indicate potential problems. OUT-OF-SERVICE indicates the **locomotive** has been taken out of service (i.e. for routine shopping, loaned power, etc.). Equipment status is kept on OUT-OF-SERVICE **locomotive** equipment, but no alarms are generated on equipment changes. NON-ALERTS indicates the **locomotive** is in contact but is not equipped with the ALERTS application. OPERATIONAL, OUT-OF-SERVICE, and NON-ALERTS states are combined with the **locomotive** contact status from LMON (the **Locomotive** Monitor function and database in **ABNS**) to create unique states for each when in and out of contact...information is stored in a database which may be accessed to determine how long certain **locomotives** have been out of contact...

...clarify, EMS stands for the Event Management System, which is a co-resident system with **ABNS** and is concerned with Tandem system real time event logging and operator reporting. As an...the application of the present invention is designed to "piggy back" on the already existing **ABNS** and ATCS systems, the ALERTS application may be quickly and easily integrated into the **locomotive** systems such as the MCP and into the system in the front-end processor. Additionally, because the application provides real-time updates regarding intelligent device changes on-board a remote **locomotive** , a dispatcher at a remote location can quickly respond to the indication of missing devices and contact the **locomotive** in question to determine the events taking place on board the **locomotive** . Previously, if devices were removed or stolen from the **locomotive** , there was no way by which a remote dispatcher could determine the time or location...

2/3,K/1 **(Item 1 from file: 15)**
DIALOG(R)File 15:ABI/Inform(R)

01005494 96-54887
Leadership up close
Kinni, Theodore B
Tapping the Network Journal v5n3 PP: 2-4 Fall 1994/Winter 1995
ISSN: 1048-5198 JRNL CODE: TNJ
WORD COUNT: 1519

...TEXT: one or two major mistakes before you get shuffled off," remembers Curtis Pendley, who worked at several major companies before becoming CEO of Omaha-based **Automated Monitoring & Control International** (AMCI, annual revenues: $20 million; 75 employees). "In a small company, the consequences are immediate. As we say around here: there were so many heroes...

2/3,K/2 **(Item 2 from file: 15)**
DIALOG(R)File 15:ABI/Inform(R)

00848957 94-98349
ISO 9000 revisited
Tierney, Robin
World Trade v7n3 PP: 45-51 Apr 1994
ISSN: 1054-8637 JRNL CODE: WLD
WORD COUNT: 2194

...TEXT: have higher budgets and more manpower to devote to ISO 9000 compliance and certification. However, small companies are making the investment as well. Omaha-based **Automated Monitoring** and **Control International** spent more than $25,000 on ISO 9000 training and certification.

"As a small company, we're slugging it out with companies that have spent ...

2/3,K/3 **(Item 1 from file: 16)**
DIALOG(R)File 16:Gale Group PROMT(R)

10822741 Supplier Number: 109844200 (USE FORMAT 7 FOR FULLTEXT)
American Technology Corp. Fills Key Engineering and Manufacturing Positions; Names Carl Gruenler as Interim Chief Accounting Officer.
Business Wire, p5169
Nov 6, 2003
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 745

... or financial issues."
Norris continued, "In addition to Carl's military management experience, he worked for six years as the first chief financial officer for **Automated Monitoring** and **Control International** Inc., a technology company spun out of Union Pacific Railroad. We appreciate his willingness to oversee our financial and accounting functions during our search."
About...

2/3,K/4 **(Item 2 from file: 16)**
DIALOG(R)File 16:Gale Group PROMT(R)

10569749 Supplier Number: 104524790 (USE FORMAT 7 FOR FULLTEXT)

American Technology Corp. Announces Expansion of Military Business; Carl Gruenler Appointed Vice President of Military Operations.
Business Wire, p5208
June 30, 2003
Language: English Record Type: Fulltext
Document Type: Newswire; Trade
Word Count: 1153

... years of business experience, Gruenler has served as president of Thomas D. Mangelsen Inc., a national retail, manufacturing and distribution company; chief financial officer of **Automated Monitoring** and **Control International** Inc., a railroad systems technology company; and a project manager/financial analyst at Union Pacific Railroad. He returned to active duty in 1999 for special...

2/3,K/5 (Item 3 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

01973758 Supplier Number: 42526504 (USE FORMAT 7 FOR FULLTEXT)
NEBRASKA
ADWEEK Midwest Edition, v0, n0, p58
Nov 18, 1991
Language: English Record Type: Fulltext
Article Type: Agency change
Document Type: Magazine/Journal; Trade
Word Count: 26

(USE FORMAT 7 FOR FULLTEXT)
TEXT:
Ayres and Associates based in Omaha won **Automated Monitoring** and **Control International** , an Omaha-based designer, manufacturer and marketer of computerized traffic control monitoring equipment for railroads.

2/3,K/6 (Item 4 from file: 16)
DIALOG(R)File 16:Gale Group PROMT(R)

01000855 Supplier Number: 41089480
CN tests ATCS effort
Modern Railroads, p16
Jan, 1990
Language: English Record Type: Abstract
Document Type: Magazine/Journal; Trade

ABSTRACT:
...movement reports from a computer terminal on a locomotive. Also involved in the pilot project testing direct electronic reports of rail car movement status is **Automated Monitoring** and **Control International** (Omaha, Nebraska). The reporting system for work orders is an Advanced Train Control Systems application that conveys the status of car movements by a [illegible]...

2/3,K/7 (Item 1 from file: 20)
DIALOG(R)File 20:Dialog Global Reporter

04277703 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Omaha World-Herald, Neb., Business People Column
KRTBN KNIGHT-RIDDER TRIBUNE BUSINESS NEWS (OMAHA WORLD-HERALD, NEB)
February 07, 1999
JOURNAL CODE: KOWH LANGUAGE: English RECORD TYPE: FULLTEXT
WORD COUNT: 1134

(USE FORMAT 7 OR 9 FOR FULLTEXT)

... brokerage for MEGA Corp., an Omaha firm dealing in commercial and industrial real estate.

Lynden L. Tennison has been hired as chief executive officer of **Automated Monitoring** and **Control International**, Omaha. He most recently was an assistant vice president at Union Pacific Railroad.

Sean Slattery has been appointed vice president of sales and Daniel Rubin...

2/3,K/8 (Item 1 from file: 47)
DIALOG(R)File 47:Gale Group Magazine DB(TM)

04301395 SUPPLIER NUMBER: 17282654 (USE FORMAT 7 OR 9 FOR FULL TEXT)
People. (hirings, firings, resignations and other staff changes in the railroad industry)(Brief Article)
Railway Age, v196, n7, p63(1)
July, 1995
DOCUMENT TYPE: Brief Article ISSN: 0033-8826 LANGUAGE: English
RECORD TYPE: Fulltext
WORD COUNT: 432 LINE COUNT: 00043

... A. Callison, vice president-law, has assumed the duties of government affairs. James I. Northcraft named to the new position of vice president-transportation.

Suppliers

Automated Monitoring and **Control International**, Inc., named J. Michael Peterson director of sales.

Black & Veatch named Steven T. Sturgeon, P.E., manager-railroad services.

BRW, Inc., named William Houppermans, P...

...COMPANY NAMES: **Automated Monitoring** and **Control International** Inc

2/3,K/9 (Item 2 from file: 47)
DIALOG(R)File 47:Gale Group Magazine DB(TM)

03405355 SUPPLIER NUMBER: 08973519 (USE FORMAT 7 OR 9 FOR FULL TEXT)
What's holding up atcs? (advanced train control systems)
Railway Age, v191, n4, p39(3)
April, 1990
CODEN: RAAGA ISSN: 0033-8826 LANGUAGE: ENGLISH RECORD TYPE: FULLTEXT
WORD COUNT: 1896 LINE COUNT: 00141

... can be seen, leaving for later those applications where payback is viewed as coming in softer dollars.

* Step-by-step funding. For example, working with **Automated Monitoring** and **Control International**, Union Pacific is moving into a four-step program in which train control will be Step 4, and there is no set timetable as to...

2/3,K/10 (Item 1 from file: 63)
DIALOG(R)File 63:Transport Res(TRIS)

00621433 DA
TITLE: **PERFORMANCE AND CAPACITY ANALYSIS OF AN OPERATING ATCS COMMUNICATIONS SYSTEM**
AUTHOR(S): Furman, EL
CORPORATE SOURCE: Transportation Research Board, 2101 Constitution Avenue, NW , Washington, DC, 20418,

JOURNAL: Transportation Research Record   Issue Number: 1314   Pag: pp
89-95
SUPPLEMENTAL NOTES: This paper appears in Transportation Research Record
No. 1314, Advanced Train Control Systems 1991: Proceedings of a
Symposium, June 17-19, 1991, Denver, Colorado.
PUBLICATION DATE: 19910000   PUBLICATION YEAR: 1991
LANGUAGE: English   SUBFILE: RRIS   (R)
ISSN: 03611981   ISBN: 0-309-05151-7
AVAILABILITY: Transportation Research Board Business Office; 2101
Constitution Avenue, NW   ; Washington; DC   ; 20418
FIGURES: 8 Fig.
REFERENCES: 5 Ref.

ABSTRACT: **Automated Monitoring** and **Control International** has been working with Union Pacific Railroad to implement a communication network based on Advanced Train Control Systems (ATCS) Specification 200. This is the first...

2/3,K/11   (Item 1 from file: 262)
DIALOG(R)File 262:CBCA Fulltext

01829032
Tandem tracks trains
Computing Canada v.13(22) Oct 29, 1987 pg 2 (871029)
COMPANY NAMES: Tandem Computers Canada Ltd.; SEL Canada; **Automated Monitoring** & **Control International** , Inc.

...COMPANY NAMES: **Automated Monitoring** & **Control International** , Inc.

2/3,K/12   (Item 1 from file: 275)
DIALOG(R)File 275:Gale Group Computer DB(TM)

01194880   SUPPLIER NUMBER: 06145812
Tandem plotting 3-D investment strategy.
Goff, Leslie
MIS Week, v8, n51, p1(3)
Dec 21, 1987
ISSN: 0199-8838   LANGUAGE: ENGLISH   RECORD TYPE: ABSTRACT

...ABSTRACT: fault-tolerant controller maker Triplex, a partnership with ITI and Pacific Bell for the development of networks, a minority holding in Netlink, a holding in **Automated Monitoring** and **Control International** , and an equity holding in Anamartic of the UK.

2/3,K/13   (Item 1 from file: 635)
DIALOG(R)File 635:Business Dateline(R)

0680484 96-37689
Firms adopt European way of assuring quality control
[illegible], Matt
Omaha World-Herald (Omaha, NE, US) pM1
PUB DATE: 960213
WORD COUNT: 981
DATELINE: Omaha, NE, US, Midwest

TEXT:

...standard revolves around satisfying customer needs," she said.

Other Firms

Nebraska companies that have gained ISO registration include:

* AT&T Network Cable Systems in Omaha; **Automated Monitoring & Control International** in Omaha; Chief Automotive Systems in Grand Island; Goodyear Tire & Rubber in Lincoln; Minnesota Mining & Manufacturing Co. in Valley; U S West Business Resources in...

2/3,K/14 (Item 1 from file: 637)
DIALOG(R)File 637:Journal of Commerce

People - TRANSPORT
JOURNAL OF COMMERCE (JC) - September 26, 1990
By: From Wire and Staff Reports
Edition: Five Star Section: TRANS Page: 5B
Word Count: 320

...was president and chief executive officer at Union Pacific Technologies, a subsidiary of the railroad's parent, Union Pacific Corp. He was also chairman of **Automated Monitoring** and **Control International** Inc., a joint venture of the railroad, Tandem Computers Inc. and SEL Canada, a division of Alcatel. His replacement at UPI and AMCI has not...

COMPANY NAMES (DIALOG GENERATED): Alcatel ; American Airlines ; **Automated Monitoring** ; **Control International** Inc ; Eurotainer U S Inc ; ITEL RAIL CORP ; LONG ISLAND RAIL ROAD ; Missouri Pacific ; SEL Canada ; Tandem Computers Inc ; TRANSAMERICA LEASING INC ; Union Pacific Corp...

2/3,K/15 (Item 2 from file: 637)
DIALOG(R)File 637:Journal of Commerce

BUSINESS INDEX
JOURNAL OF COMMERCE (JC) - THURSDAY August 31, 1989
Edition: FIVE STAR Section: FRONT Page: 2A
Word Count: 915

...Towing Co. 3B

Audi of America 4A

Australia-New Zealand Direct Line 1A

Australian Broadcasting Corp. 2B

Australian National Lines 1B

Austria Metall AG 7A

Automated Monitoring and **Control International** Inc. 2B

Avery Inc. 7A
Avmark Inc. 1A

Bacardi Corp. 4A

Bauxite Industry Development Co. 7A

Bay Ocean Carriers Ltd. 1B

Bay Tankers Inc. 1B...

2/3,K/16 (Item 3 from file: 637)
DIALOG(R)File 637:Journal of Commerce

TRAFFIC BRIEFS
JOURNAL OF COMMERCE (JC) - THURSDAY August 31, 1989
By: From Wire and Staff Reports
Edition: FIVE STAR Section: RAILROADS Page: 2B
Word Count: 576

... conditions weaken, UTC's portfolio of long-term leases will ensure solid, stable cash flow."

CN SIGNS DEAL TO TEST

WORK-ORDER SYSTEM

OMAHA, Neb. - **Automated Monitoring** and **Control International** Inc. has signed a 15-month pilot work-order contract with Canadian National Railways.

The AMCI system allows CN crews on three test trains operating...

2/3,K/17 **(Item 4 from file: 637)**
DIALOG(R)File 637:Journal of Commerce

BUSINESS IN TODAY'S NEWS
JOURNAL OF COMMERCE (JC) - THURSDAY September 1, 1988
Edition: FIVE STAR Section: FRONT Page: 2A
Word Count: 1,408

...11B

Aon Corp. 5C

Apex Marine Corp. 14B

Applied Insurance Research 5C

Arab Insurance Group 8C

Atchison, Topeka & Santa Fe Railway 2B

Ausimont Inc. 8B

Automated Monitoring & **Control International** Inc. 2B
Baltimore Gas & Electric Co. 11B

Banco Central SA 7A

Banfi Vintners 7T

BankAmerica Corp. 5A

Banque Paribas 8C

Batus Inc. 9A

Belvedere Insurance...

2/3,K/18 **(Item 5 from file: 637)**
DIALOG(R)File 637:Journal of Commerce

ELECTRONIC SYSTEMS TO CONTROL TRAINS BECOMING A REALITY
JOURNAL OF COMMERCE (JC) - THURSDAY September 1, 1988
By: GREGORY S. JOHNSON Journal of Commerce Staff (Second of Two Parts)

Edition: FIVE STAR Section: RAILROADS Page: 2B
Word Count: 835

... system, he said. But we're very interested in both technologies, he noted.

Union Pacific Railroad is interested in the ground transponder system designed by **Automated Monitoring & Control International** Inc. of Omaha, Neb. Bruce G. Burton, AMCI's president, said UP owns one-third of AMCI.

In AMCI's system, computers aboard locomotives are...

COMPANY NAMES (DIALOG GENERATED): Association of American Railroads ; Atchison Topeka & Santa ; **Automated Monitoring & Control International** Inc ; Brotherhood ; Fe Railway ; Locomotive Engineers ; Norfolk Southern Corp ; Railways Association of Canada ; Santa Fe ; Union Pacific Railroad ; University of Pennsylvania ; Wharton School

2/3,K/19 (Item 6 from file: 637)
DIALOG(R)File 637:Journal of Commerce

NEW RAIL TECHNOLOGY SHOULD SAVE ON LABOR
JOURNAL OF COMMERCE (JC) - MONDAY August 29, 1988
By: GREGORY S. JOHNSON Journal of Commerce Staff (First of Two Articles)
Edition: FIVE STAR Section: RAILROADS Page: 2B
Word Count: 731

... 150 feet, he said. And it'll be many, many years before we have enough satellites in the air to do even that, he said.

Automated Monitoring and **Control International** Inc. is one designer of a ground-based railroad control system. The Omaha, Neb.-based company is owned jointly by Union Pacific Corp., Tandem Corp...

2/3,K/20 (Item 7 from file: 637)
DIALOG(R)File 637:Journal of Commerce

UP ACQUIRES COMPUTER PARTNERS
JOURNAL OF COMMERCE (JC) - WEDNESDAY September 30, 1987
By: MAUREEN ROBB Journal of Commerce Staff
Edition: FIVE STAR Section: RAIL Page: 4B
Word Count: 465

TEXT:
...to develop electronic train control systems.

Tandem Computers Inc. of Cupertino, Calif., and SEL Canada of Don Mills, Ontario, have joined UP as shareholders of **Automated Monitoring** and **Control International** Inc. UP owns the majority interest in AMCI, which it started last January.

UP's Omaha, Neb., development firm is working on systems to improve ...

2/3,K/21 (Item 8 from file: 637)
DIALOG(R)File 637:Journal of Commerce

RAIL BRIEFS
JOURNAL OF COMMERCE (JC) - TUESDAY September 22, 1987
By: Wire and Staff Reports

Edition: FIVE STAR Section: RAIL Page: 4B
Word Count: 123

OMAHA, Neb. - AMCI, **Automated Monitoring** and **Control International** Inc., said SEL Canada and Tandem Computers have joined Union Pacific Railroad as stockholders in the company.

SEL Canada of Ontario, Canada, is a division...

2/3,K/22 (Item 1 from file: 810)
DIALOG(R)File 810:Business Wire

0064081 BW619

TANDEM SEL CANADA: (UNP) Tandem Computers, SEL Canada join Union Pacific in new joint venture for advanced train control system

September 21, 1987

Byline: Business Editors

Tandem Computers Inc. (NYSE:TDM) Monday announced that it and SEL Canada have joined Union Pacific Railroad as stockholders in **Automated Monitoring** and **Control International** Inc. of Omaha, Neb., a closely-held corporation established to develop and market electronic monitoring and control systems.

AMCI will initially concentrate on developing an...

...in Cupertino,
manufactures and markets computer systems and networks for on-line transaction processing.

CONTACT: Tandem Computers Inc., Cupertino
Joyce Strand, 408/725-6516
or
Automated Monitoring and **Control International** Inc., Omaha
Marjorie Fredd, 402/498-4904

2/3,K/23 (Item 1 from file: 990)
DIALOG(R)File 990:NewsRoom Current Nov 2003-2004/Feb 13

0738038153 16E41588
S-4: ISECURETRAC CORP
EDGAR Forms
Wednesday, November 26, 2003
JOURNAL CODE: BDFA LANGUAGE: English RECORD TYPE: Fulltext
DOCUMENT TYPE: Newswire
WORD COUNT: 43,649

2/3,K/24 (Item 2 from file: 990)
DIALOG(R)File 990:NewsRoom Current Nov 2003-2004/Feb 13

0728029727 16CJ0X0Y
8-K: AMERICAN TECHNOLOGY CORP /DE/
EDGAR Forms
Thursday, November 6, 2003
JOURNAL CODE: BDFA LANGUAGE: English RECORD TYPE: Fulltext
DOCUMENT TYPE: Newswire
WORD COUNT: 1,091

...financial issues."

Mr. Norris continued, "In addition to Carl's military management experience, he worked for six years as the first chief financial officer for **Automated Monitoring** and **Control International**, Inc., a technology company spun out of Union Pacific Railroad. We appreciate his willingness to oversee our financial and accounting functions during our search."

About...

2/3,K/25 (Item 1 from file: 995)
DIALOG(R)File 995:NewsRoom 2000

0067025971 15260TCL
Honors and Elections
Omaha World-Herald (NE), p20
Monday, May 8, 2000
JOURNAL CODE: ADHJ LANGUAGE: ENGLISH RECORD TYPE: Fulltext
DOCUMENT TYPE: Newspaper
WORD COUNT: 275

TEXT:
...at Chadron (Neb.) State College, Professor of the Year; and Allen Stow, network service manager at First National Bank of Omaha, Guru of the Year. **Automated Monitoring** and **Control International** in Omaha received the Technology Company of the Year award. Lorshire Lo, a student at Omaha North High School, was named a United States National...

2/3,K/26 (Item 2 from file: 995)
DIALOG(R)File 995:NewsRoom 2000

0005012185 14YA0CWS
Business People; Eggers Gets Baker's Post
Omaha World-Herald (NE), p3.m
Sunday, January 9, 2000
JOURNAL CODE: ADHJ LANGUAGE: ENGLISH RECORD TYPE: Fulltext
DOCUMENT TYPE: Newspaper
WORD COUNT: 597

...companies.

Before being hired at World Media, Geppert was president and CEO at VideoYellowPagesUSA. Prior to that, he held executive positions at First Data Solutions, **Automated Monitoring** and **Control International**, Applied Communications Inc. and the NCR Corp.

Cassling Diagnostic Imaging

... Ray has been named vice president of sales and marketing at Integrated ... Solutions...

2/9/10 **(Item 1 from file: 63)**
DIALOG(R)File 63:Transport Res(TRIS)

00621433 DA
TITLE: PERFORMANCE AND CAPACITY ANALYSIS OF AN OPERATING ATCS COMMUNICATIONS SYSTEM
AUTHOR(S): Furman, EL
CORPORATE SOURCE: Transportation Research Board, 2101 Constitution Avenue, NW , Washington, DC, 20418,
JOURNAL: Transportation Research Record Issue Number: 1314 Pag: pp 89-95
SUPPLEMENTAL NOTES: This paper appears in Transportation Research Record No. 1314, Advanced Train Control Systems 1991: Proceedings of a Symposium, June 17-19, 1991, Denver, Colorado.
PUBLICATION DATE: 19910000 PUBLICATION YEAR: 1991
LANGUAGE: English SUBFILE: RRIS (R)
ISSN: 03611981 ISBN: 0-309-05151-7
AVAILABILITY: Transportation Research Board Business Office; 2101 Constitution Avenue, NW ; Washington; DC ; 20418
FIGURES: 8 Fig.
REFERENCES: 5 Ref.
ABSTRACT: **Automated Monitoring** and **Control International** has been working with Union Pacific Railroad to implement a communication network based on Advanced Train Control Systems (ATCS) Specification 200. This is the first large-scale implementation of the ATCS communications systems. Computer performance predictions and data from the installed system give insight into the capabilities of this type of mobile data network. Expected throughput of the network is estimated on the basis of analytical models. The successful large-scale implementation of a Specification 200 network on Union Pacific indicates that the ATCS specifications provide the basis for a viable communication network.
DESCRIPTORS: ADVANCED TRAIN CONTROL SYSTEMS; SPECIFICATION; COMMUNICATION SYSTEMS; PERFORMANCE; CAPACITY; UNION PACIFIC RAILROAD; IMPLEMENTATION
SUBJECT HEADING: H21,FACILITIES DESIGN

2/9/11 **(Item 1 from file: 262)**
DIALOG(R)File 262:CBCA Fulltext

01329032
Tandem tracks trains
Computing Canada v.13(22) Oct 29, 1987 pg 2 (871029)
COMPANY NAMES: Tandem Computers Canada Ltd.; SEL Canada; **Automated Monitoring** & **Control International** , Inc.

2/9/18 **(Item 5 from file: 637)**
DIALOG(R)File 637:Journal of Commerce

ELECTRONIC SYSTEMS TO CONTROL TRAINS BECOMING A REALITY
JOURNAL OF COMMERCE (JC) - THURSDAY September 1, 1988
By: GREGORY S. JOHNSON Journal of Commerce Staff (Second of Two Parts)
Edition: FIVE STAR Section: RAILROADS Page: 2B
Word Count: 835

MEMO:
Series

TEXT:
When it comes to advanced train control systems, Union Pacific Railroad and Burlington Northern Railroad are acknowledged to be the industry's pioneers.

BN signed a contract with Rockwell International Corp. in 1984 to

develop the Advanced Railroad Electronics System, a satellite/ground-based transponder control system, said Steven R. Ditmeyer, BN's chief engineer, research, communications and control systems.

The system can use either satellites or ground transponders to track trains, he said. By transmitting data from computers aboard locomotives, ARES displays a train's position, speed, monitors locomotive performance and gives dispatchers track profiles, speed limits, schedules and consist profiles.

ARES also reduces radio transmission by converting normal radio traffic to data communications.

Patrick Harker, a professor at the University of Pennsylvania's Wharton School, and a railroad consultant, said that with these new types of automated train control devices, one dispatcher could run a whole railroad.

In 1985, BN equipped two locomotives with ARES and eight months ago it began operating 10 ARES-equipped locomotives on 230 miles of track between the iron ore mines of Minnesota's Mesabi Iron Range and Lake Superior.

BN now has spent more than $10 million on ARES and has 17 ARES locomotives, Mr. Ditmeyer said. But any decision to expand ARES further won't come before 1989, he said.

Although BN hedged on a price tag for expanding ARES to BN's 25,000-mile system, a BN spokesman previously said it would cost between $100 million and $300 million to equip the railroad's 2,500 diesels with electronic controls and probably would take 18 to 30 months to complete.

The Atchison, Topeka & Santa Fe Railway, like other carriers, is working closely with Automated Train Control System, an industry group sponsored by the Association of American Railroads and Railways Association of Canada. We've researched this and will continue to explore it, said Homer C. Henry, Santa Fe's system director, train operating practices.

Norfolk Southern Corp. has placed its plans to develop a satellite-based system on hold because of a satellite dearth, said Bob Fort, a NS spokeman. When there's enough satellites, we'll look at that again, he said.

The satellite shortage was caused by a slowdown in U.S. satellite launches following the Challenger shuttle tragedy.

NS is presently investigating testing the ground-based transponder system, he said. But we're very interested in both technologies, he noted.

Union Pacific Railroad is interested in the ground transponder system designed by **Automated Monitoring & Control International** Inc. of Omaha, Neb. Bruce G. Burton, AMCI's president, said UP owns one-third of AMCI.

In AMCI's system, computers aboard locomotives are triggered when trains pass transponders, he said. The computers measure the number of times a locomotive's wheels turn between mileposts and relay the data by radio to a central computer, he said.

Mr. Burton said railway officials from China, Australia, Mexico, France and Britain have inquired about his company's system, which he said could be adapted for truckers or any industry that uses mobile services.

AMCI has conducted analyses for three other U.S. railroads, but Mr. Burton declined to identify them.

Now, the next step is a pilot program and then system implementation, he said.

AMCI's biggest customer thus far is UP. The carrier has tested AMCI for

two years, according to John Bromley, a UP spokesman. Even though UP hasn't decided to go system-wide with AMCI, he estimated it would cost about $100 million.

UP has 10 AMCI-equipped locomotives on its coal line from Wyoming's Powder River Basin to North Platte, Neb., Mr. Bromley said. UP chose the Powder River line because its trains operate there free of non-UP traffic.

Because its AMCI central computer already contains information on all UP trains, including length and cargo weight, UP can schedule train meets and dictate individual train speed for certain track segments, like curves and hills, Mr. Bromley explained.

It's great for safety, the engineers love it, he said. it gives them profiles of grades and curves and displays slow orders or work on tracks. The control system also safeguards against engineers who may miss a signal or otherwise be headed for danger, he said.

A spokesman for the Brotherhood of Locomotive Engineers concurred.

We welcome this modern technology, said Bob Crawford, BLE's assistant the president. We want to get into the 21st century as fast as we can. The BLE has 27,800 active engineers.

Even though the new control systems conceivably could replace rail engineers one day, the BLE says it isn't worried.

Whether the engineer is in the cab, on the ground, in the tower or at a remote location, someone still has to push the button to tell the train to go or to tell the train to stop, he said.

He also said large-scale introduction of any satellite system is far off for two reasons: the satellite shortage and public relations.

Imagine what the public is going to say when they realize a 10,000-ton train is barreling down a track with no one on it, he said.

DESCRIPTORS: RAILROAD TELECOMMUNICATION; TRANSPORT
COMPANY NAMES (DIALOG GENERATED): Association of American Railroads ; Atchison Topeka & Santa ; **Automated Monitoring & Control International** Inc ; Brotherhood ; Fe Railway ; Locomotive Engineers ; Norfolk Southern Corp ; Railways Association of Canada ; Santa Fe ; Union Pacific Railroad ; University of Pennsylvania ; Wharton School

2/9/19 **(Item 6 from file: 637)**
DIALOG(R)File 637:Journal of Commerce

NEW RAIL TECHNOLOGY SHOULD SAVE ON LABOR
JOURNAL OF COMMERCE (JC) - MONDAY August 29, 1988
By: GREGORY S. JOHNSON Journal of Commerce Staff (First of Two Articles)
Edition: FIVE STAR Section: RAILROADS Page: 2B
Word Count: 731

MEMO:
Series

TEXT:
Railroad researchers are developing technology that could lead to the elimination of dispatchers, signalmen and maybe even engineers.

The new technology ranges from satellites able to track trains from space to on-board computers that tell engineers when to slow down, speed up or stop.

If, for example, an engineer didn't abide by a computer's suggestions,

The computer would seize control and bring the train to a halt.

Such technology is not new. Computers run more than a few railroad systems already. The Japanese Bullet Trains and San Francisco's BART subway being the most notable computer-operated rail systems.

However, both BART and the Japanese bullet trains have human technicians aboard their trains in case of trouble.

Here in the United States, two freight railroads, Union Pacific Railroad .and Burlington Northern Railroad, have tested the waters heavily. UP has been testing a ground-based system for two years while BN has tested a satellite system for the same duration.

North of the border, the CP Rail subsidiary of Canadian Pacific Ltd. has tested a system similar to UP's north of Calgary and Canadian National Railways is considering a trial run.

Nearly all the systems are able to keep tabs on a moving train from transponder sensors buried in a track road bed. When a moving train passes the sensor, a microprocessor computer aboard the locomotive is switched on and the train's location is relayed to a central dispatch console.

The on-board computer calculates a locomotive's wheel turns from milepost to milepost giving an accurate location and speed of a train.
These systems are called fixed microwave, automated train control systems, said Chris Allman, director of spectrum management, Association of American Railroads.

AAR encourages the use of these systems, which use 900 MHz transponders. Such systems are ideal for pinpointing a train at crucial sites, like before and after track switches, Mr. Allman said.

While a system using satellites can do the same, it's not accurate under 150 feet, he said. And it'll be many, many years before we have enough satellites in the air to do even that, he said.

Automated Monitoring and **Control International** Inc. is one designer of a ground-based railroad control system. The Omaha, Neb.-based company is owned jointly by Union Pacific Corp., Tandem Corp. of Cupertino, Calif., and Sell Canada, a Toronto high-technology firm.

AMCI's system is based on a central computer containing details of a railroad's network and make-up of a train, according to Bruce G. Burton, the company's president. The main computer transmits this data back and forth via radio to computers on-board train locomotives.
Aboard the train, the data, displayed in video form, indicates when an engineer should slow down, as on curves or in areas where crews are working on tracks, when to increase speed to stay on schedule and even when to stop.

In the event an engineer doesn't respond in time or ignores instructions, the computer seizes control and shuts down the locomotive, Mr. Burton said.

The system can be operated from a central location, from a control tower or by a person standing on the ground.

Union Pacific has been testing AMCI's control system along its Wyoming coal hauling route.

A satellite-based system, called Advanced Railroad Electronics System, is being developed by the Collins Air Transport division of Rockwell International Corp. of Cedar Rapids, Iowa.

Collins' system uses four U.S. Air Force satellites, orbiting 10,900 nautical miles in space. The satellites can pinpoint a train's location within 150 feet and its speed within 1 mph. BN is now testing Rockwell's

system along its route in the Misabe iron range in Minnesota.

The rest of the nation's railroads, along with Canadian and Mexican railroads, are relying on the Advanced Train Control System, a group sponsored by both AAR and the Railway Association of Canada and run by 80 rail officials.

More than 50 electronics suppliers and designers are working with ATCS to develop new train control systems, said Peter J. Detmold, the group's executive director.

This is something that will be a major move toward automation in railroads, he said. Instead of having lots of local management, in the future, railroads will work from small computerized centers communicating directly with the trains.

He predicted the introduction of the new systems will spawn myriads of new computer programming, but could take years to fully complete.

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File  15:ABI/Inform(R) 1971-2004/Feb 13
         (c) 2004 ProQuest Info&Learning
File  16:Gale Group PROMT(R) 1990-2004/Feb 13
         (c) 2004 The Gale Group
File  18:Gale Group F&S Index(R) 1988-2004/Feb 13
         (c) 2004 The Gale Group
File  20:Dialog Global Reporter 1997-2004/Feb 13
         (c) 2004 The Dialog Corp.
File  47:Gale Group Magazine DB(TM) 1959-2004/Feb 12
         (c) 2004 The Gale group
File  63:Transport Res(TRIS) 1970-2004/Jan
         (c) fmt only 2004 Dialog Corp.
File 148:Gale Group Trade & Industry DB 1976-2004/Feb 13
         (c)2004 The Gale Group
File 262:CBCA Fulltext 1982-2004/Feb
         (c) 2004 Micromedia Ltd.
File 275:Gale Group Computer DB(TM) 1983-2004/Feb 13
         (c) 2004 The Gale Group
File 484:Periodical Abs Plustext 1986-2004/Feb W3
         (c) 2004 ProQuest
File 570:Gale Group MARS(R) 1984-2004/Feb 13
         (c) 2004 The Gale Group
File 608:KR/T Bus.News. 1992-2004/Feb 13
         (c)2004 Knight Ridder/Tribune Bus News
File 610:Business Wire 1999-2004/Feb 13
         (c) 2004 Business Wire.
File 621:Gale Group New Prod.Annou.(R) 1985-2004/Feb 13
         (c) 2004 The Gale Group
File 635:Business Dateline(R) 1985-2004/Feb 13
         (c) 2004 ProQuest Info&Learning
File 637:Journal of Commerce 1986-2004/Feb 11
         (c) 2004 Commonwealth Bus. Media
File 649:Gale Group Newswire ASAP(TM) 2004/Feb 02
         (c) 2004 The Gale Group
File 805:ONTAP(R) Gale Group Computer DB(TM)
         (c) 1999 The Gale Group
File 810:Business Wire 1986-1999/Feb 28
         (c) 1999 Business Wire
File 990:NewsRoom Current Nov 2003-2004/Feb 13
         (c) 2004 The Dialog Corporation
File 992:NewsRoom 2003/Jan-Oct 31
         (c) 2004 The Dialog Corporation
File 995:NewsRoom 2000
         (c) 2004 The Dialog Corporation

Set     Items   Description
S1         53   (AUTOMATED()MONITORING)(1W)(CONTROL()INTERNATIONAL)
S2         26   RD (unique items)
```

```
File 411:DIALINDEX(R)

 DIALINDEX(R)
   (c) 2004 The Dialog Corporation plc

*** DIALINDEX search results display in an abbreviated ***
*** format unless you enter the SET DETAIL ON command. ***
?set files all
   You have 556 files in your file list.
   (To see banners, use SHOW FILES command)
?s (automated()monitoring)(1w)(control()international)

Your SELECT statement is:
   s (automated()monitoring)(1w)(control()international)

           Items   File
           -----   ----
               3    15: ABI/Inform(R)_1971-2004/Feb 12
Processing
Processing
               4    16: Gale Group PROMT(R)_1990-2004/Feb 13
               1    18: Gale Group F&S Index(R)_1988-2004/Feb 13
               3    20: Dialog Global Reporter_1997-2004/Feb 13
               3    47: Gale Group Magazine DB(TM)_1959-2004/Feb 12
               1    63: Transport Res(TRIS)_1970-2004/Jan
      Examined  50 files
      Examined 100 files
               5   148: Gale Group Trade & Industry DB_1976-2004/Feb 13
      Examined 150 files
               1   262: CBCA Fulltext_1982-2004/Feb
               1   275: Gale Group Computer DB(TM)_1983-2004/Feb 13
      Examined 200 files
               2   345: Inpadoc/Fam.& Legal Stat_1968-2003/UD=200406
      Examined 250 files
               9   416: DIALOG COMPANY NAME FINDER(TM)_2003/NOV
      Examined 300 files
               1   484: Periodical Abs Plustext_1986-2004/Feb W3
               1   519: D&B-Duns Finan.Records Plus(TM)_2003/Sep
      Examined 350 files
               2   541: SEC Online(TM) Annual Repts_1997/Sep W3
               3   545: Investext(R)_1982-2004/Feb 13
               1   570: Gale Group MARS(R)_1984-2004/Feb 13
      Examined 400 files
               2   608: KR/T Bus.News._1992-2004/Feb 13
               2   610: Business Wire_1999-2004/Feb 13
               2   621: Gale Group New Prod.Annou.(R)_1985-2004/Feb 13
               3   635: Business Dateline(R)_1985-2004/Feb 12
              10   637: Journal of Commerce_1986-2004/Feb 11
               2   649: Gale Group Newswire ASAP(TM)_2004/Feb 02
Processing
               1   654: US Pat.Full._1976-2004/Feb 10
      Examined 450 files
      Examined 500 files
               1   805: ONTAP(R) Gale Group Computer DB(TM)_
               1   810: Business Wire_1986-1999/Feb 28
      Examined 550 files
               2   990: NewsRoom Current Nov 2003-2004/Feb 13
               2   992: NewsRoom 2003/Jan-Oct 31
               2   995: NewsRoom 2000

   28 files have one or more items; file list includes 556 files.
```

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File  63:Transport Res(TRIS) 1970-2004/Jan
         (c) fmt only 2004 Dialog Corp.
File 553:Wilson Bus. Abs. FullText 1982-2004/Jan
         (c) 2004 The HW Wilson Co
File 484:Periodical Abs Plustext 1986-2004/Feb W3
         (c) 2004 ProQuest
File   8:Ei Compendex(R) 1970-2004/Feb W1
         (c) 2004 Elsevier Eng.  Info. Inc.
File  35:Dissertation Abs Online 1861-2004/Jan
         (c) 2004 ProQuest Info&Learning
File  65:Inside Conferences 1993-2004/Feb W2
         (c) 2004 BLDSC all rts. reserv.
File   2:INSPEC 1969-2004/Feb W1
         (c) 2004 Institution of Electrical Engineers
File  94:JICST-EPlus 1985-2004/Feb W1
         (c)2004 Japan Science and Tech Corp(JST)
File 483:Newspaper Abs Daily 1986-2004/Feb 12
         (c) 2004 ProQuest Info&Learning
File   6:NTIS 1964-2004/Feb W3
         (c) 2004 NTIS, Intl Cpyrght All Rights Res
File 144:Pascal 1973-2004/Feb W1
         (c) 2004 INIST/CNRS
File  99:Wilson Appl. Sci & Tech Abs 1983-2004/Jan
         (c) 2004 The HW Wilson Co.
File  95:TEME-Technology & Management 1989-2004/Jan W4
         (c) 2004 FIZ TECHNIK
File 438:Library Lit. & Info. Science 1984-2004/Jan
         (c) 2004 The HW Wilson Co

Set     Items   Description
S1        301   ADVANCE? ?()TRAIN? ?()CONTROL?()SYSTEM? ?
S2          8   S1 AND WIRELESS?
S3          7   RD (unique items)
S4        216   RD S1 (unique items)
S5        201   S4 NOT PY=2000:2004
S6       6424   (COMMUNICAT? OR TRANSMIT? OR TRANSMISSION? ?)(5N)(TRAIN? ?
             OR LOCOMOTIVE? ? OR RAILROAD? ?)
S7         62   S5 AND S6
S8         57   S7 NOT S3
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3/5/1 **(Item 1 from file: 63)**
DIALOG(R)File 63:Transport Res(TRIS)

00737263 DA
TITLE: THE INTELLIGENT HIGHWAY-RAIL INTERSECTION: INTEGRATING ITS AND ATCS FOR IMPROVED GRADE CROSSING OPERATION AND SAFETY
AUTHOR(S): NWAGBOSO, CO(ED); RICHARDS, HA; BARTOSKEWITZ, RT
CORPORATE SOURCE: JOHN WILEY & SONS LTD, BAFFINS LANE, CHICHESTER, WEST SUSSEX, PO19 1UD, UNITED KINGDOM
JOURNAL: ROAD VEHICLE AUTOMATION II. TOWARDS SYSTEMS INTEGRATION. PROCEE DINGS OF THE 2ND INTERNATIONAL CONFERENCE ON ROAD VEHICLE AUTOMATION, VEHICLE SYSTEMS RESEARCH CENTRE, FACULTY OF TECHNOLOGY, BOLTON INSTITUTE, BOLTON, UK, 11-13 SEPTEMBER 1995 Pag: 510-9
PUBLICATION DATE: 19970000 PUBLICATION YEAR: 1997
LANGUAGE: ENGLISH SUBFILE: IRRD (I)
IRRD DOCUMENT NUMBER: 887780
ISBN: 0-471-96726-2
REFERENCES: 2
DATA SOURCE: Transport Research Laboratory (TRL)
ABSTRACT: Historically, the intersection and pre-emption of traffic control devices at Level Crossings have been restricted to individual nearby intersections. Positive train location, direction and speed will improve the credibility of these devices and reduce the time motorists must wait for trains to clear the intersection. Intrusion detection, in-vehicle alerting systems, and vehicle navigational aid s are systems either currently being tested or under consideration. Both roadway agencies and railroad companies are studying the use of sophisticated technologies for monitoring and controlling operations . Current investigation into advanced railroad signal technologies, including **Advanced Train Control Systems** (ATCS), Positive Train Separation (PTS), Automatic Equipment Identification (AEI), automati c level crossing health and status monitoring, and **wireless** video monitoring suggests the possibility of innovative practices for the improvement of safety and congestion at level crossings. The use of computers, sensors, satellite technology and state-of-the-art communications can produce significant benefits to the highway user of level crossings. This paper provides a status report of research underway at the Texas A&M IVHS (Intelligent Vehicle-Highway Systems) center that is integrating IVHS roadway technology with railroad ATCS. (A) For the covering abstract see IRRD 887751.
DESCRIPTORS: CONFERENCE; LEVEL CROSSING; INTELLIGENT TRANSPORT SYSTEM; SAFETY; WARNING; VEHICLE; LOCATION; TECHNOLOGY; COMMUNICATION

3/5/2 **(Item 1 from file: 553)**
DIALOG(R)File 553:Wilson Bus. Abs. FullText

[illegible] H.W. WILSON RECORD NUMBER: BWBA99072536 (USE FORMAT 7 FOR FULLTEXT)
PTC: is FRA pushing too hard?.
AUGMENTED TITLE: positive train control
Sullivan, Tom
Railway Age v. 200 no8 (Aug. 1999) p. 49-50+
DOCUMENT TYPE: Feature Article ISSN: 0033-8826
LANGUAGE: English
COUNTRY OF PUBLICATION: United States
RECORD TYPE: Abstract; Fulltext RECORD STATUS: Corrected or revised record
WORD COUNT: 3021

ABSTRACT: In less than two years, the major U.S. railroads have made major progress in working with the industry to develop its next-generation train-control technology, which is known as Positive Train Control (PTC), but it is unclear whether actual PTC deployment will be quick enough to satisfy the Federal Railway Administration (FRA). This is partly due to the fact that the FRA's own timetable may have become infected by a need for

political expediency. Details of how PTC works and the FRA requirements are provided.
DESCRIPTORS:
Railroads--Automation
COMPANY NAME: United States _Federal Railroad Administration
SIC CODES: 4010; 9621

3/5/3 **(Item 2 from file: 553)**
DIALOG(R)File 553:Wilson Bus. Abs. FullText

03565701 H.W. WILSON RECORD NUMBER: BWBA97065701 (USE FORMAT 7 FOR FULLTEXT)
Communications-based train control: implementing the revolution.
AUGMENTED TITLE: International Conference on Communications-Based Train Control, Washington, D.C.
Vantuono, William C
Railway Age (Railw Age) v. 198 (July '97) p. 57-8+
DOCUMENT TYPE: Feature Article ISSN: 0033-8826
LANGUAGE: English
COUNTRY OF PUBLICATION: United States
RECORD TYPE: Abstract; Fulltext RECORD STATUS: Corrected or revised record
WORD COUNT: 3965

ABSTRACT: Details are provided of the 1997 Railway Age/De Leuw, Cather International Conference on Communications-Based Train Control (CBTC). The conference was attended by more than 220 representatives of a diverse cross-section of the industry--operators, suppliers, consultants, state departments of transportation, and officials from the Federal Railroad Administration and Federal Transit Administration. Topics discussed included the implementation of CBTC technology on time and within budget; interoperability; standardization; start-up and life-cycle costs; procurement practices; technical, schedule, and institutional problems that need to be overcome; and lessons that have been learned thus far from the shift to CBTC.

DESCRIPTORS:
Railroads--Communication systems; Railroads--Automation; Local transit--Communication systems; Local transit--Automation
SIC CODES: 4010; 4111

3/5/4 **(Item 1 from file: 484)**
DIALOG(R)File 484:Periodical Abs Plustext

03359559 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Implementing the revolution
Vantuono, William C
Railway Age (IRAA), v198 n7, p57-64, p.7
Jul 1997
ISSN: 0033-8826 JOURNAL CODE: IRAA
DOCUMENT TYPE: Feature
LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 3698

ABSTRACT: Participants in a "Railway Age"/De Leuw, Cather conference discussed interoperability, standardization, start-up and life-cycle costs, procurement practices, and other issues affecting the worldwide shift to Communications-Based Train Control.

DESCRIPTORS: Benefit cost analysis; Railroads; Traffic control; Communications; Conferences
SPECIAL FEATURES: Photograph

3/5/5 **(Item 2 from file: 484)**
DIALOG(R)File 484:Periodical Abs Plustext

01970774 (USE FORMAT 7 OR 9 FOR FULLTEXT)
Defense conversion funds awarded for MK/Hughes/BART test
Anonymous
Railway Age (IRAA), v195 n4, p22, p.1
Apr 1994
ISSN: 0033-8826 JOURNAL CODE: IRAA
DOCUMENT TYPE: News
LANGUAGE: English RECORD TYPE: Fulltext; Abstract
WORD COUNT: 669 LENGTH: Medium (10-30 col inches)

ABSTRACT: As part of the Clinton Administration's Technology Reinvestment Program, an alliance of Morrison Knudsen, Hughes Aircraft and the Bay Area Rapid Transit District has been awarded $19.5 million in defense conversion funds. The alliance will develop and test an automated train control system.

DESCRIPTORS: Contracts; Trains; Research & development; R&D; Alliances; Automation
COMPANY INFORMATION:
Bay Area Rapid Transit District
Morrison-Knudsen Corp
Hughes Aircraft Co

3/5/6 **(Item 1 from file: 2)**
DIALOG(R)File 2:INSPEC

5650163 INSPEC Abstract Number: C9709-3360B-020
Title: **The intelligent highway-rail intersection: integrating ITS and ATCS for improved grade crossing operation and safety**
Author(s): Richards, H.A.; Bartoskewitz, R.T.
Conference Title: Road Vehicle Automation II Towards Systems Integration. Proceedings of the 2nd International Conference on Road Vehicle Automation p.510-19
Editor(s): Nwagboso, C.O.
Publisher: Wiley, Chichester, UK
Publication Date: 1997 Country of Publication: UK xxviii+611 pp.
ISBN: 0 471 96726 2 Material Identity Number: XX95-02757
Conference Title: Proceedings of 2nd International Conference on Road Vehicle Automation
Conference Sponsor: Int. Series on Road Vehicle Autom.; Soc. Automotive Eng.; IOP; ITS FOCUS
Conference Date: 11-13 Sept. 1995 Conference Location: Bolton, UK
Language: English Document Type: Conference Paper (PA)
Treatment: Applications (A); Practical (P)
Abstract: Historically, the intersection and preemption of traffic control devices at level crossings have been restricted to individual nearby intersections. Positive train location, direction and speed will improve the credibility of these devices and reduce the time motorists must wait for trains to clear the intersection. Intrusion detection, in-vehicle alerting systems, and vehicle navigational aids are systems either currently being tested or under consideration. Both roadway agencies and railroad companies are studying the use of sophisticated technologies for monitoring and controlling operations. Current investigation into advanced railroad signal technologies, including **advanced train control systems** (ATCS), positive train separation (PTS), automatic equipment identification (AEI), automatic level crossing health and status monitoring, and **wireless** video monitoring suggests the possibility of innovative practices for the improvement of safety and congestion at level crossings. The use of computers, sensors, satellite technology and state-of-the-art communications can produce significant benefits to the

highway user of level crossings. This paper provides a status report of research underway at the Texas A&M IVHS (intelligent vehicle-highway systems) center that is integrating IVHS roadway technology with railroad ATCS. (2 Refs)

Subfile: C

Descriptors: automated highways; rail traffic; road traffic

Identifiers: intelligent highway-rail intersection; traffic control devices; level crossings; positive train location; intrusion detection; in-vehicle alerting systems; vehicle navigational aids; roadway agencies; railroad companies; monitoring; advanced railroad signal technologies; **advanced train control systems** ; positive train separation; automatic equipment identification; automatic level crossing; **wireless** video monitoring; satellite technology; state-of-the-art communications; roadway technology; intelligent vehicle highway systems

Class Codes: C3360B (Road-traffic system control); C3360D (Rail-traffic system control); C7445 (Traffic engineering computing); C7420 (Control engineering computing)

3/5/7 (Item 2 from file: 2)

DIALOG(R)File 2:INSPEC

03680765 INSPEC Abstract Number: B90053692, C90050907

Title: Development of wireless **railway control system in foreign countries**

Author(s): Hasegawa, Y.

Journal: Shingo Hoan vol.44, no.10 p.413-18

Publication Date: 1989 Country of Publication: Japan

CODEN: SHIHA4 ISSN: 0286-3006

Language: Japanese Document Type: Journal Paper (JP)

Treatment: Practical (P)

Abstract: The application of radio communications to railway control was initiated about two decades ago and practically applied to mine railways in the French Riviera and in Jordan and to the trunk line in Finland. In 1980, an entirely new method which permitted radio communication between trains and control centers was developed in Canada and the electronic token system in the UK and the **wireless** operation method in West Germany quickly followed. The author discusses the present status of the jointly developed ATCS (**advanced train control system**) in the US and ASTREE (automatisation du suire en temps reel) in France. The comparison between ATCS and ASTREE is illustrated. (19 Refs)

8/5/4 **(Item 4 from file: 63)**
DIALOG(R)File 63:Transport Res(TRIS)

00676345 DA
TITLE: EVALUATION OF THE NORTH AMERICAN ADVANCED TRAIN CONTROL SYSTEM
AUTHOR(S): Haakinson, EJ; Rust, WR; Garrity, MM
CORPORATE SOURCE: Department of Commerce, Office of Telecommunications, 325 Broadway , Boulder, CO, 80303,
REPORT NUMBER: NTIA-94-312
Pag: 44p
SUPPLEMENTAL NOTES: Sponsored by Federal Railroad Administration, Washington, DC.
PUBLICATION DATE: 19940600 PUBLICATION YEAR: 1994
LANGUAGE: English SUBFILE: RRIS (R)
ISSN: N/A
AVAILABILITY: National Technical Information Service; 5285 Port Royal Road ; Springfield; VA ; 22161
ORDER NUMBER: PB94-206190-WTS
ABSTRACT: The railroad industry has proposed an advanced system for train control. The report presents an evaluation of the system development process, with particular emphasis on the data **communication** system that interconnects dispatch center, **locomotives** , track maintenance vehicles, and wayside devices. The report describes the proposed train control system, establishes generic requirements for collision avoidance and telecommunication system development, and analyzes the system in light of the generic requirements.
DESCRIPTORS: ADVANCED SYSTEMS; TRAIN CONTROL; CONTROL SYSTEMS; TELECOMMUNICATION SYSTEMS; DISPATCHING; COLLISION AVOIDANCE SYSTEMS; RAILROAD INDUSTRY
SUBJECT HEADING: R11 ADVANCED SYSTEMS

8/5/5 **(Item 5 from file: 63)**
DIALOG(R)File 63:Transport Res(TRIS)

00662854 DA
TITLE: COMMAND, CONTROL, COMMUNICATION, AND INFORMATION SYSTEMS
AUTHOR(S): Moody, HG
CORPORATE SOURCE: Transportation Research Board, 2101 Constitution Avenue, NW , Washington, DC, 20418,
JOURNAL: CONFERENCE PROCEEDINGS 2 Pag: pp 71-78
PUBLICATION DATE: 19940000 PUBLICATION YEAR: 1994
LANGUAGE: English SUBFILE: RRIS (R)
ISSN: 10731652 ISBN: 0309055032
AVAILABILITY: Transportation Research Board Business Office; 2101 Constitution Avenue, NW ; Washington; DC ; 20418
ORDER NUMBER: N/A
FIGURES: 3 Fig.
REFERENCES: 2 Ref.
ABSTRACT: This paper discusses the interest of **railroads** in advanced command, control, **communication** , and information (C3&I) technology. One C3&I project, the **Advanced Train Control System** (ATCS), is described, and research topics in support of that project are proposed. C3&I systems are being implemented to improve railroad productivity, customer service, and service reliability. Although significant progress has been made, even greater progress is in store in the future as railroads take advantage of advanced computer and digital data communication technology.
CONFERENCE TITLE: Railroad Freight Transportation Research Needs
CONFERENCE LOCATION: Bethesda, Maryland
CONFERENCE BEGIN DATE: 19940712
CONFERENCE END DATE: 19940714
CONFERENCE SPONSOR: Transportation Research Board; American Association of Railroads; and Federal Railroad Administration.
DESCRIPTORS: CONFERENCES; RAILROADS; FREIGHT TRANSPORTATION; RESEARCH NEEDS

; ADVANCED TECHNOLOGY; COMMAND AND CONTROL SYSTEMS; **COMMUNICATION** SYSTEMS; INFORMATION SYSTEMS; **ADVANCED TRAIN CONTROL SYSTEM** ; PRODUCTIVITY; CUSTOMER SERVICE; RELIABILITY
SUBJECT HEADING: R21 FREIGHT OPERATIONS; H12 PLANNING

8/5/6 (Item 6 from file: 63)
DIALOG(R)File 63:Transport Res(TRIS)

00643341 DA
TITLE: MUNI CHOOSES ATCS
AUTHOR(S): READ, B
CORPORATE SOURCE: SIMMONS-BOARDMAN PUBLISHING CORPORATION, 345 HUDSON STREET, NEW YORK , 10014, UNITED KINGDOM
JOURNAL: INTERNATIONAL RAILWAY JOURNAL Vol: 33 Issue Number: 6 Pag: P49
PUBLICATION DATE: 19930600 PUBLICATION YEAR: 1993
LANGUAGE: ENGLISH SUBFILE: IRRD (I)
SOURCE ACCESSION NUMBER: 9312TR403E
IRRD DOCUMENT NUMBER: 860781
ISSN: 0744-5326
REFERENCES: 0
DATA SOURCE: Transport Research Laboratory (TRL)
ABSTRACT: This article describes the installation by Muni Metro of a moving- block **advanced train control system** on the underground section of it s LRT network in San Francisco. The new system will replace the obsole te and failure - prone fixed-block cab- signalling system currently in use on the 12 year old section. Because this is the first applicati on of moving-block technology to a manned LRT, the decision has caused controversy. Details are given of criticisms of the scheme, the expected benefits, the problems with the existing fixed-block system , and Muni's plans for retrofitting. The Alcatel ATCS chosen relies on inductive loops to continually **transmit** and receive **train** instructio ns and data to a control centre. This has previously been used on ligh t metros in Vancouver, Toronto and Detroit.
DESCRIPTORS: RAILWAY (TRACK); CONTROL; UNDERGROUND RAILWAY; USA; TRAFFIC SIGNAL

8/5/7 (Item 7 from file: 63)
DIALOG(R)File 63:Transport Res(TRIS)

00621434 DA
TITLE: RAILROAD OPERATION USING THE ADVANCED TRAIN CONTROL SYSTEM
AUTHOR(S): Poltorak, DA; Bailey, JH
CORPORATE SOURCE: Transportation Research Board, 2101 Constitution Avenue, NW , Washington, DC, 20418,
JOURNAL: Transportation Research Record Issue Number: 1314 Pag: pp 96-101
SUPPLEMENTAL NOTES: This paper appears in Transportation Research Record No. 1314, Advanced Train Control Systems 1991: Proceedings of a Symposium, June 17-19, 1991, Denver, Colorado.
PUBLICATION DATE: 19910000 PUBLICATION YEAR: 1991
LANGUAGE: English SUBFILE: RRIS (R)
ISSN: 03611981 ISBN: 0-309-05151-7
AVAILABILITY: Transportation Research Board Business Office; 2101 Constitution Avenue, NW ; Washington; DC ; 20418
FIGURES: 2 Fig.
ABSTRACT: The basic approach taken in the development of the **Advanced Train Control System** (ATCS) has been that railroad operations can be made safer and more efficient by applying modern command, control, and communications technology. By using precise speed and location information, the system is able to provide more timely and precise traffic information than traditional train control systems. This allows ATCS to benefit from "moving block" operation, where the separation

necessary for safe operation is dynamically determined from traffic levels and capabilities of trains (e.g., braking distances and location updates). Smaller train separation is made possible with a resultant increase in line capacity. Major design elements employed by ATCS are the data communications system and information-processing nodes that reside at the central dispatch office, on board locomotives, on board work vehicles, and in field devices. The use of these elements will have a significant impact on the manner in which dispatchers, enginemen, and foremen conduct their daily operations. These elements also provide for numerous applications besides train control.
DESCRIPTORS: **ADVANCED TRAIN CONTROL SYSTEMS** ; DATA **TRANSMISSION** ; **COMMUNICATION** ; DATA PROCESSING; **RAILROAD** ; OPERATION
SUBJECT HEADING: H21,FACILITIES DESIGN

8/5/15 (Item 15 from file: 63)
DIALOG(R)File 63:Transport Res(TRIS)

00568452 DA
TITLE: THE COMMUNICATIONS SYSTEM ARCHITECTURE OF THE NORTH AMERICAN ADVANCED TRAIN CONTROL SYSTEM
AUTHOR(S): COLL, DC
JOURNAL: IEEE TRANSACTIONS ON VEHICULAR TECHNOLOGY Vol: VT-3
Issue Number: 3 Pag: PP 244-255
SUPPLEMENTAL NOTES: DAVID C. COLL ... CHARTS
PUBLICATION DATE: 19900800 PUBLICATION YEAR: 1990
LANGUAGE: ENGLISH SUBFILE: TLIB (L)
DATA SOURCE: UC, BERKELEY, INSTITUTE FOR TRANSPORTATION STUDIES 22302001
ABSTRACT: No abstract provided.
DESCRIPTORS: **RAILROAD** ; AUTOMATIC **TRAIN** CONTROL; **COMMUNICATION** SYSTEMS ; ELECTRONIC EQUIPMENT

8/5/29 (Item 7 from file: 553)
DIALOG(R)File 553:Wilson Bus. Abs. FullText

[illegible]49497 H.W. WILSON RECORD NUMBER: BWBA95049497
Services and technology: reengineering the railroads.
Harker, Patrick T
Interfaces (Interfaces) v. 25 (May/June '95) p. 72-80
DOCUMENT TYPE: Feature Article ISSN: 0092-2102
LANGUAGE: English
COUNTRY OF PUBLICATION: United States
RECORD TYPE: Abstract RECORD STATUS: New record

ABSTRACT: Like all major railroads, the Burlington Northern (BN) must handle the problem of "dark track," an area of rail on which the dispatcher can determine a **train** 's position only through voice **communication** with the **train** crew. Such a system clearly does not optimize use of the available track capacity and can result in congestion. To overcome these problems, BN, in conjunction with Rockwell International, is developing the Advanced Railroad Electronics System (ARES), which uses the NAVSTAR Global Positioning System to provide locational information for trains and maintenance vehicles. An **advanced train control system** like ARES provides a wealth of data previously not available to rail management, but all of this information can be overwhelming unless the railroad reengineers the production processes that underlie the delivery of rail services. The use of MS/OR analysis to match the use of ARES with the strategic direction of BN and its service delivery operations is discussed.

DESCRIPTORS:
Railroads--Communication systems; Reengineering (Business)
COMPANY NAME: Burlington Northern Inc --Communication systems
SIC CODES: 4010; 4011

8/5/30 **(Item 8 from file: 553)**
DIALOG(R)File 553:Wilson Bus. Abs. FullText

03027592 H.W. WILSON RECORD NUMBER: BWBA95027592 (USE FORMAT 7 FOR FULLTEXT)
Controlling the future.
AUGMENTED TITLE: via better communications
Welty, Gus
Railway Age (Railw Age) v. 196 (Jan. '95) p. 33-4+
DOCUMENT TYPE: Feature Article ISSN: 0033-8826
LANGUAGE: English
COUNTRY OF PUBLICATION: United States
RECORD TYPE: Abstract; Fulltext RECORD STATUS: Corrected or revised record
WORD COUNT: 2735

ABSTRACT: A look at the players that are providing **railroads** with better control through improved **communications** . Developments involving **Advanced Train Control Systems** , electro-pneumatic braking systems, Harmon Industries' incremental train control system, the issue of "refarming" the radio channel spectrum, the outsourcing of data handling needs, and communications-based transit signaling are discussed. A sidebar explains how the Federal Railroad Administration's Notice of Proposed Rulemaking regarding power brakes would kill innovation among railroads and suppliers.
DESCRIPTORS:
Railroads--Communication systems
SIC CODES: 4010

8/5/33 **(Item 11 from file: 553)**
DIALOG(R)File 553:Wilson Bus. Abs. FullText

02530734 H.W. WILSON RECORD NUMBER: BWBA93030734
Rebuilding America's railroads: the information evolution.
AUGMENTED TITLE: **advanced train control system** , EDI and information systems
Welty, Gus
Railway Age (Railw Age) v. 194 (Feb. '93) p. 85-90
DOCUMENT TYPE: Feature Article ISSN: 0033-8826
LANGUAGE: English
COUNTRY OF PUBLICATION: United States
RECORD TYPE: Abstract RECORD STATUS: New record

ABSTRACT: This year and next all major and most smaller **railroads** are expected to implement sophisticated **communications** systems that will improve the flow of information. ISS (Interline Settlement System) will centrally manage revenue sharing among the railroads participating in an interline movement, while REN (Rate EDI Network) will communicate rail prices to other carriers. When the systems are implemented, billing and interline settlements should be completed quickly and accurately, without the disputes and delays that can arise. Railinc, a wholly-owned, for-profit subsidiary created by the Association of American Railroads, will be at the heart of the implementation process. Railinc has been working with contractors to facilitate the implementation of ISS and REN as well as the development of IRF (Industry Reference Files), which essentially is an editing function that will be administered through the association's Economics and Finance Department.

DESCRIPTORS:
Information systems--Railroad use; Railroads--Automation; Railroads--Electronic data interchange
SIC CODES: 4010; 7370

8/5/43 **(Item 5 from file: 8)**
DIALOG(R)File 8:Ei Compendex(R)

03065009 E.I. Monthly No: EIM9105-021329
Title: ATCS Data Communications Network model.
Author: Sharif, Hamid R.
Corporate Source: Univ of Nebraska-Lincoln, NE, USA
Conference Title: Proceedings of the Twenty-First Annual Pittsburgh Conference Part 2 (of 5)
Conference Location: Pittsburgh, PA, USA Conference Date: 19900503
Sponsor: Univ of Pittsburgh, Dep of Electrical Engineering; IEEE, Pittsburgh Section; ISA; IEEE Systems, Man & Cybernetics Soc; Soc for Computer Simulation; et al
E.I. Conference No.: 14260
Source: Expert Systems, Artificial Intelligence, Neural Networks, Vision, Manufacturing Modeling and Simulation, Proceedings of the Annual Pittsburgh Conference v 21 pt part 2. Publ by Soc for Computer Simulation Int, San Diego, CA, USA. p 587-591
Publication Year: 1990
CODEN: MSPCD4
Language: English
Document Type: PA; (Conference Paper) Treatment: G; (General Review)
Journal Announcement: 9105
Abstract: This paper presents an outline of a computer model description designed to analyze the critical links in the Data **Communications** Network of the **Advanced Train Control System** (ATCS) protocol. The ATCS Data Communications Network consists of a User Interface Data Network, a Ground Data Network, and a pair of Radio Frequency Links. The computer model was designed and implemented using Network II.5 a Computer Aided Design (CAD) modeling and simulation software package from CACI. The model's simulation results provide characteristics and behaviors of the Data Communications Network under different loading scenarios regarding the timing, capacity, throughput, etc. (Author abstract)
Descriptors: COMPUTERS--*Data **Communication** Systems; **RAILROADS** --Automatic Train Control; COMPUTER AIDED DESIGN
Identifiers: DATA **COMMUNICATION** NETWORK; **ADVANCED TRAIN CONTROL SYSTEM** (ATCS)
Classification Codes:
723 (Computer Software); 731 (Automatic Control Principles)
72 (COMPUTERS & DATA PROCESSING); 73 (CONTROL ENGINEERING)

8/5/49 (Item 11 from file: 8)
DIALOG(R)File 8:Ei Compendex(R)

02277885 E.I. Monthly No: EIM8710-066860
Title: ATCS: ADVANCED TRAIN CONTROL SYSTEM COMMUNICATION **ARCHITECTURE AND DATA TRANSMISSION CONSIDERATIONS.**
Author: Sheikh, Asrar U.; Lee, Janson
Corporate Source: Lapp-Hancock Associates Ltd, Ottawa, Ont, Can
Conference Title: 37th IEEE Vehicular Technology Conference.
Conference Location: Tampa, FL, USA Conference Date: 19870601
Sponsor: IEEE Vehicular Technology Soc, New York, NY, USA
E.I. Conference No.: 10215
Source: IEEE Vehicular Technology Conference 37th. Publ by IEEE, New York, NY, USA. Available from IEEE Service Cent (Cat n 87CH2429-9), Piscataway, NJ, USA p 214-221
Publication Year: 1987
CODEN: IVTCDZ ISSN: 0740-0551
Language: English
Document Type: PA; (Conference Paper)
Journal Announcement: 8710
Abstract: The communication architecture and mobile radio link data link between the locomotive and the dispatcher's office is the most important part of an **advanced train control system** . The results of simulation study carried out in search for a suitable error-control technique are described. The Gilbert-Elliot model has been used to represent mobile radio data channel. From this model error files have been produced and viability

of error-control techniques evaluated. Results on four techniques show that error control techniques are susceptible to threshold, Doppler frequency, and the receiver threshold. A combination of automatic repeat request and forward-error correction with minimal error correction capability is recommended. 12 refs.

Descriptors: RAILROADS--*Automatic **Train** Control; DATA **TRANSMISSION** ; RADIO SYSTEMS, MOBILE; TELECOMMUNICATION LINKS, RADIO; CODES, SYMBOLIC--Error Correction

Identifiers: **ADVANCED TRAIN CONTROL SYSTEM** (ATCS); ERROR-CONTROL TECHNIQUE; GILBERT-ELLIOT MODEL; AUTOMATIC REPEAT REQUEST (ARQ)

Classification Codes:

681 (Railroad Plant & Structures); 716 (Radar, Radio & TV Electronic Equipment); 731 (Automatic Control Principles)

68 (RAILROAD ENGINEERING); 71 (ELECTRONICS & COMMUNICATIONS); 73 (CONTROL ENGINEERING)

8/5/57 (Item 2 from file: 6)

DIALOG(R)File 6:NTIS

1537466 NTIS Accession Number: MIC-90-05794

Advanced train control systems : **A selective bibliography**

Houghton, C. ; Rogers, D.

Lapp-Hancock Associates, Montreal (Quebec).

Corp. Source Codes: 888888888;

Sponsor: Transportation Development Center, Montreal (Quebec).

c1989 47p

Languages: English

Journal Announcement: GRAI9101

Text in English and French (Bilingual).

Order this product from NTIS by: phone at 1-800-553-NTIS (U.S. customers); (703)605-6000 (other countries); fax at (703)321-8547; and email at orders@ntis.fedworld.gov. NTIS is located at 5285 Port Royal Road, Springfield, VA, 22161, USA.

NTIS Prices: PC E07/MF E01

Country of Publication: Canada

International bibliography of selected works dealing with **advanced train control systems** (ACTS) published from 1978 to September 1988, with emphasis on the project of the Association of American **Railroads** . Categories covered include development documents, **communication** and signaling systems and equipment, on-board (train) equipment, related R&D, associated tests and related pilot projects, reviews of the ATCS project and related publications, and other **advanced train control systems** and equipment. An index of personal and corporate authors is included.

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ATCS Specification 200 (Series)

Communications Systems Architecture Specification (200), V.4.0

The ATCS Communications Systems Architecture sets forth the architecture of the data link system for ATCS. It identifies the hardware and software components for ATCS communications, their functions and the nature of the interfaces between them.

Mobile Communications Package Specification (210), V.4.0

The ATCS Mobile Communications Package identifies its functions and the nature of the interfaces. There are companion specifications that describe the architecture of the ATCS communications system, locomotive equipment, track forces equipment, wayside equipment and the computer-aided dispatch system.

Front End Processor Specification (220), V.4.0

The ATCS Front End Processor ATCS identifies its major functions and interfaces. There are companion specifications that describe the architecture of the ATCS , its major subsystems, and each of the subsystems' major components.

Cluster Controller Specification (225), V.4.0

The ATCS Cluster Controller identifies major functions and interfaces. There are companion specifications that describe the architecture of ATCS, its major subsystems, and each subsystems' major components.

Base Communications Package Specification (230), V.4.0

The ATCS Base Communications Package (BCP) identifies the major functions, external interfaces and performance requirements for the BCP.

Message Formats Specification (250), V.4.0

The ATCS Message Formats set forth the message contents for use in ATCS. The objects to be placed in messages, their bit encoding, and placement within the message text are defined.

ATCS Communication System Architecture Specification 200 Table of Contents

ATCS Mobile Communications Package Specification 210 Table of Contents

ATCS Front End Processor Specification 220 Table of Contents

ATCS Cluster Controller Specification 225 Table of Contents

ATCS Base Communications Package Specification 230 Table of Contents

ATCS Message Formats Specification 250 Table of Contents

How to order

For more information contact:

Howard Moody
Manager Train Control Technology
Operations and Maintenance Department
50 F Street, N.W.
Washington, D.C. 20001-1564
(202) 639-2202
FAX No. (202) 639-2465

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3.1.3 ATCS Data Communications System Operational Overview

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3.2.3 Safety
3.2.4 Security Commentary
3.2.5 Environmental

3.3 DESIGN AND CONSTRUCTION (Commentary)
3.4 DOCUMENTATION
4.0 QUALITY ASSURANCE
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APPENDIX B - PRESENTATION LAYER PROTOCOL (LAYER 6)
APPENDIX C - SESSION LAYER PROTOCOL (LAYER 5)
APPENDIX D - TRANSPORT LAYER PROTOCOL (LAYER 4)
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APPENDIX F - INTENTIONALLY DELETED
APPENDIX G - NETWORK LAYER VIRTUAL CIRCUIT [NV] PROTOCOL (LAYER 3)
APPENDIX H - NETWORK LAYER (DATAGRAM-RADIO NETWORK) PROTOCOL (LAYER 3)
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APPENDIX J - DATALINK LAYER ATCS/HDLC POLLED PROTOCOL (LAYER 2)
APPENDIX K - DATALINK LAYER HDLC BALANCED PROTOCOL (LAYER 2)
APPENDIX L - DATALINK LAYER (ATCS RADIO LINK) PROTOCOL (LAYER 2)
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APPENDIX R - ROUTING AND VEHICLE FOLLOWING RULES AND PROCEDURES
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APPENDIX W - RADIO NETWORK FORWARD ERROR CORRECTING CODE SPECIFICATION
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APPENDIX Z - VEHICLE AND FIELD SYSTEM NETWORK LAYER ROUTING

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ATCS Mobile Communication Package Specification 210 Table of Contents

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Appendix A: MCP Power Connector

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ATCS Front End Processor Specification 220 Table of Contents

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3.3 DESIGN AND CONSTRUCTION
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ATCS Message Formats Specification 250 Table of Contents

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Appendices of this specification (excluding Appendix E) are provided in electronic format as separate files on the Specification 250 diskette. Appendix E is released in hardcopy.

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SYSTEM ARCHITECTURE

ATCS SPECIFICATION 100

REVISION 4.0

MAY 1995

CHANGE RECORD SHEET FOR ATCS SPECIFICATION 100

Revision	Date of Release	Affected Pages	Purpose of Change & Applicable SPRs
4.0	5/95	2-1, 2-2	SPR 180 - added version numbers in "Applicable Documents".
4.0	5/95	3-3	SPR 195 - added "braking" to predictive enforcement.
4.0	5/95	3-7, 3-9	SPR 238 - second paragraph - LSI references modified; SPR 207 - last paragraph - removed references to withdrawn specifications.
4.0	5/95	3-10	SPR 238 - Figure 3-4 changed voltage to +15Vdc, removed SCU from ILC box.
4.0	5/95	3-10	SPR 238 - Figure 3-5 changed voltage to +15Vdc.
4.0	5/95	2-1, 3-13	SPR 208 - removed reference to withdrawn Specification 150 - deleted last paragraph.
4.0	5/95	All	SPR 179 - checked for any grammatical/typo errors for consistency in specification format.
3.0	3/93	All	Remove control flows and associated descriptions. SPR #67.

Revised footer, Sections 1.0 and 2.0, 3.0 - 4.0, Appendix A and Appendix B.

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FOREWORD

Purpose of ATCS Specifications

This specification for Advanced Train Control Systems (ATCS) has been developed through a public, open-forum process involving contracted systems engineers, railroad industry professionals, and suppliers. The purpose of this and other ATCS specifications is to define the performance and interface requirements for ATCS hardware and software. ATCS specifications are designed to document the stated requirements of railroad operational and technical professionals concerning ATCS hardware and software. These specifications are designed to facilitate compatibility and standardization without limiting the internal design approaches of individual suppliers.

Publication of this specification does not commit any railroad to purchase any hardware or software described herein, require any railroad to use this specification for the purchase of

hardware or software generally described, nor constitute endorsement of any supplier's product designed or built according to this specification. Decisions to purchase any product developed in accordance with this specification are matters of discretion and judgment on the part of individual railroads and individual suppliers.

ATCS SYSTEM ARCHITECTURE

1.0 SCOPE

This document sets forth the system architecture for the Advanced Train Control Systems. This specification identifies the hardware and software components of ATCS, their functions and the nature of the interfaces between them. Companion specifications describe the architecture of the ATCS communications system, locomotive system, track forces system, field system and the computer-aided dispatch system. These five system architecture specifications identify the specific hardware and software requirements that apply to the respective systems and define the integration requirements for each. System logic specifications exist for the locomotive, track forces, field and dispatch systems. These specifications describe the logic and data flow within and among the various systems. This document also defines a glossary, and conventions and assumptions. The glossary, and conventions and assumptions are considered commentary and are not part of the standard.

Equipment suppliers should note that this and related ATCS documents encourage them to produce high-performance, low maintenance, high-reliability equipment. They are free to accomplish these objectives and satisfy the requirements of this specification by means of design techniques and technology which they consider to be cost effective and appropriate. Compliance with these specifications does not imply automatic compliance with existing regulatory and safety requirements. Suppliers providing and railroads purchasing hardware and software for ATCS must ensure independently their compliance with the appropriate regulations.

ATCS SYSTEM ARCHITECTURE

2.0 APPLICABLE DOCUMENTS

The following documents are a part of this specification to the extent that they are referenced herein. In the event of a conflict between the documents referenced herein and the requirements of this specification, the contents of this specification shall take precedence.

ATCS Specification 110, Version 4.0, Environmental Requirements

ATCS Specification 130, Version 4.0, Recommended Practices for Software Quality Assurance

ATCS Specification 140, Version 4.0, Recommended Practices for Safety and Systems Assurance

ATCS Specification 153, Version 4.0, System Logic - OBC

ATCS Specification 154, Version 4.0, System Logic - CDC

ATCS Specification 155, Version 4.0, System Logic - WIU

ATCS Specification 156, Version 4.0, System Logic - TFT

ATCS Specification 160, Version 4.0, Configuration Management Plan

ATCS Specification 200, Version 4.0, Communications System Architecture

ATCS Specification 210, Version 4.0, Mobile Communications Package

ATCS Specification 220, Version 4.0, Front End Processor

ATCS Specification 225, Version 4.0, Cluster Controller

ATCS Specification 230, Version 4.0, Base Communications Package

ATCS Specification 250, Version 4.0, Message Formats

ATCS Specification 300, Version 4.0, Locomotive System Architecture

ATCS Specification 310, Version 4.0, Locomotive Computer

ATCS Specification 311, Version 4.0, Predictive Enforcement Braking

ATCS Specification 320, Version 4.0, Locomotive Displays & Controls

ATCS Specification 335, Version 4.0, Transponder/Interrogator

ATCS Specification 400, Version 4.0, Dispatch System Architecture

ATCS Specification 500, Version 4.0, Field Systems Architecture

ATCS Specification 530, Version 4.0, Wayside Interface Unit

ATCS Specification 600, Version 4.0, Work Vehicle System Architecture

ATCS Specification 610, Version 4.0, Track Forces Terminal

ATCS Specification 620, Version 4.0, Work Vehicle Display and Control Unit

ATCS SYSTEM ARCHITECTURE

3.0 REQUIREMENTS

The basic principle behind ATCS is to provide a cost efficient, safe, modular, train control system with an open architecture. The primary goals of the system are to provide for:

- compatibility of systems across railroads. This helps to ensure seamless operation. For example, locomotives from one railroad will be able to communicate, via data radio, with dispatch centers from other roads when operating on their track. Certain baselines, such as standard communications protocols and message formats, have been developed to ensure this goal is met.
- the ability for each railroad to selectively implement the capabilities and features it needs. Full-fledged ATCS implementation on an entire railroad is not always appropriate or feasible. ATCS has been designed to allow for selective implementation on various parts of a railroad.
- a modular growth path from less capable implementations to more capable implementations. This eliminates the need for an "all-at-once" approach that would be difficult and expensive to achieve. In fact, railroads can implement ATCS at a rate that makes sense from both the service and fiscal points of view.
- the ability to implement a system with components from different suppliers. This relieves the railroads of the need to purchase potentially expensive and complex converters that are often needed to interconnect and interface various vendor components. As a result, user costs should be reduced by providing for expanded sources of supply.

The approach that has been taken to achieve these goals is to develop performance and interface specifications (also called form-fit-function or F^3 specifications) for ATCS components that stress:

- functions to be performed;
- performance levels to be achieved;
- interfaces (electrical and data);
- box sizes, shapes and mounting (*i.e.*, mechanical interfaces);
- environmental constraints; and
- design standards (hardware and software).

ATCS specifications do not dictate internal design and construction of system components; they do, however, explicitly define functionality and interfaces without limiting supplier design creativity. The critical aspect of the specifications is the interfaces, which must be strictly adhered to in order to ensure an open, extensible system.

ATCS specifications represent the minimum requirements necessary to achieve component interoperability. There are, however, aspects of system operation which do not impinge on component interoperability, and must therefore be specified by the procuring railroad. Items

that must be specified by the procuring railroad include:

procedures for dispatcher position changes;
the specifics of interfaces to corporate data systems (*e.g.*, form and format of data queries and responses);
any special add-on devices or computer programs that adapt ATCS to individual railroad operating practices;
detailed implementation of software functions; and
restrictions on or requirements for other implementation issues such as operating system selection, fail-over techniques, transaction scheduling, and algorithm design.

3.1 SYSTEM DEFINITION

The primary ATCS functions are:

management of track occupancies through centralized route and block interlocking logic;
issuance of movement authorities via the data link to equipped trains and work vehicles, and via voice radio to unequipped trains and work vehicles;
tracking of equipped train location and track occupancies via the data link, and unequipped train location and track occupancies via voice reports and manual entry;
speed enforcement for equipped trains;
enforcement of limits of authority for equipped trains;
pacing for fuel economy for equipped trains;
monitoring and control of wayside systems;
reporting of equipped train diagnostics and operating parameters; and
general exchange of instructions and messages.

These functions are implemented in a common system architecture with system configurations determined by individual railroads.

Figure 3-1 shows the ATCS architecture, which is comprised of five major systems. Four of these systems are the information processing systems that reside at the central dispatch office (the Central Dispatch Computer), on-board locomotives (the On-Board Computer), on-board work vehicles (the Track Forces Terminal) and in the field (the Wayside Interface Unit). These systems collect, process, and distribute data with minimal input from dispatchers, enginemen, and foremen. The fifth system and the ATCS keystone, is the modern data communications system, which ties the various information processing systems together and significantly reduces the need for voice communications.

The function of the dispatch system is to manage the movement of trains throughout the rail network with the objective of guaranteeing safe operations without incurring train delays. The function of the locomotive system is to provide automatic location tracking and reporting, predictive enforcement braking, and automated transmission of movement authorities and switch monitoring and control information via the data communications system. The primary function of the work vehicle system is to provide the capability for a track maintenance foreman to communicate with the central dispatch system and other vehicles via the data communications system. The ATCS field system is designed to provide remote monitoring and control of wayside devices.

ATCS has been designed for modular expansion, which allows for varying levels of operational sophistication. Three basic levels of operation have been identified, although many hybrid configurations are expected in actual installations. The three basic levels and their capabilities are shown in Table 3-1.

TABLE 3-1. BASELINE ATCS OPERATING LEVELS

CAPABILITY/LEVEL	10	20	30
Centralized Route/Block Interlocking	R	R	
Voice Delivery of Mas/Operating Instructions	R	R*	R*
Data Delivery of Mas/Operating Instructions		R	R
Voice Reporting of Train Location	R	R*	R*

Manual Reporting of Train Location/Auto. Delivery		R	R*
Automatic Reporting and Delivery of Train Location			R
Speed Enforcement			R
Movement Authority Limit Enforcement			R
Mon./Ctl. Field Dev. by Code Lines from Central	O	O	O
Mon./Ctl. Field Dev. by Datalink from Central	O	O	O
Mon./Ctl. Field Devices from Loco. Cab		O*	O*
Automatic Reporting of ATCS Device Health		R	R
Automatic Locomotive Health Reporting		O	O
R = Required capability for this level R* = Required capability to support fall back to lower operating levels O = Optional capability O* = Optional capability for field and central/required on locomotives			

Level 30 operation assumes that trains are equipped with an enforcement system, a datalink system, an on-board computer, a location system, and a display. Field devices may or may not be ATCS equipped and/or controlled. The dispatcher has a computer (CDC) which can communicate via the datalink to the on-board ATCS equipment and ATCS equipped field devices.

Level 20 operation is similar to Level 30 operation except that the train has no enforcement capability, no location system and less sophisticated on-board processing capability.

Level 10 operation is similar to Level 20 and 30 operation except that the train has no on-board ATCS equipment, or the ATCS equipment on the train is disabled or turned off. Note that in Level 10 no capability exists for the train to contact equipped field devices directly. Also note that field devices are able to function unaware of the equipped level of the train.

In Level 10 operation, the dispatcher delivers Track Condition Notices (TCNs) and Track Work Protection (TWP) to the engineman or foreman via the voice radio. Where railroads have mechanisms in place to deliver written TCNs and TWPs, a confirmation that the items are on hand should be substituted for voice delivery. It is important, however, that the CDC receive verification that the crew has these items in hand.

ATCS can be viewed in a broader perspective than simply a 'new and improved' train control system. In its most general form, ATCS is a large distributed information processing system

which can provide additional benefits to the railroads by performing applications besides train control. These applications include work order reporting, locomotive health monitoring, codeline replacement, and track force data communication.

Work order reporting can be streamlined by using the data communications system to provide timely exchange of information on pickups and setouts between the central dispatch system and locomotives. Work orders can be sent to the locomotive as part of a data download at the beginning of a trip, and can be updated while the locomotive is *en route*. Timely reporting of completed work can ensure that traffic management systems provide up-to-date information for customer queries.

Locomotive health monitoring systems, which aid in the evaluation of locomotive performance and failure diagnosis, can also make use of the data communications system. On-board sensors can be used to continuously monitor critical mechanical and electrical parameters; data on those parameters can either be "massaged" on-board or transmitted in "raw" form to a central maintenance facility via the data communications system. Remote monitoring at the central facility might be used to optimize fueling procedures, detect incipient failures, diagnose transient or intermittent failures, or provide the basis of a reliability centered maintenance program (as contrasted with a fixed inspection schedule).

The ATCS data communications system can also be used for code line replacement. Code messages generated by existing code systems could be translated into ATCS messages and sent to Wayside Interface Units, where they would be re-translated into the original code message for interfacing to existing signal systems.

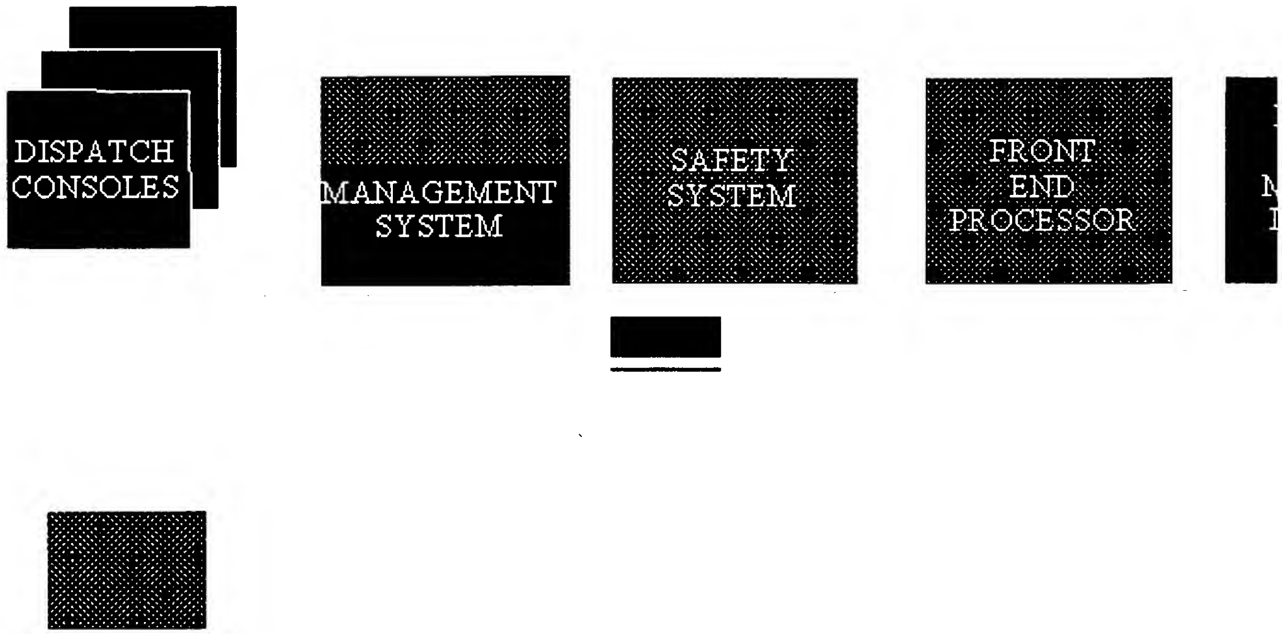
Voice communications between the dispatcher and track foreman can be significantly reduced by using the data communications system to transmit work requests and to report work completed. Retrieval of pertinent track data or other information might be made transparent to the dispatcher by using the data communications system.

The applications mentioned above do not require the train control application to be implemented; however, there is considerable benefit in having a standardized infrastructure of communications, message formats, and processing capability upon which to overlay these and the many other applications that will undoubtedly be developed in the future.

3.1.1 Dispatch System

The Dispatch System, shown in Figure 3-2, is the central operating and controlling host of the Advanced Train Control Systems. Key elements of the Dispatch System are the dispatching consoles, the Central Management Computer (CMC) and the Central Safety Computer (CSC). The front end processor and the corporate MIS interface are important interfaces between the dispatch system and the railroad. The Dispatch System is specified in ATCS Specifications 154 and 400.

The dispatching consoles form the man-machine interface between the dispatchers and the Dispatch System. As this interface does not directly impact on interoperability, the consoles are not standardized. Dataflows between the man-machine interface and the CMC/CSC are defined as part of ATCS Specifications 154 and 250.



The Central Management Computer assists the dispatcher in performing the general planning and other non-critical functions of train dispatching including handling of non-vital message traffic. This element is only partly standardized. Certain planning and management functions are central to the operation of ATCS; however, many embellishments are possible and these are not standardized.

The Central Safety Computer performs the function of tracking and managing movements and requested movements. This involves detection of potential conflicts, setting routes, monitoring the status of switches and grade crossings, and tracking train progress. This system also performs the tasks necessary to send and receive vital data messages. The safety system is functionally standardized and specified in ATCS Specification 154.

The interface to Corporate MIS is not standardized; it handles the formatting of data so that various corporate data systems, such as crew scheduling, motive power, or billing can share data with the ATCS management system, and so that the Central Safety System can obtain train consist data from Corporate MIS. Optionally, this consist data may be entered into ATCS manually. Dataflow between ATCS and Corporate MIS are defined as part of ATCS Specification 154 and ATCS Specification 250, Appendix L.

3.1.2 Communications System

The ATCS Communications System, which significantly reduces the need for voice communications, is the mechanism by which the diverse elements of ATCS exchange data. The communications system is composed of two major segments; a ground segment and an RF segment. Figure 3-3 depicts the system topology. The ground segment consists of Front End Processors connected to one or more Cluster Controllers; each Cluster Controller controls a number of base stations or wayside devices. The detailed topology and physical method of connection (leased line, fiber optic, microwave, etc.) is a railroad option. The specifications for the network are flexible enough to allow nearly any topology or mode of ground connection to be used. The general architecture of the communications system, including a detailed description of the system protocols, is contained in ATCS Specification 200; specifications for the Front End Processor, Cluster Controller, Base Communications Package (BCP), and Mobile Communications Package (MCP) are contained in ATCS Specifications 220, 225, 230, and 210, respectively.

The Base Communications Packages (BCP) interface the ground segment to the RF segment of the communications system. Mobile Communications Packages (MCP) interface clients to the RF segment of the communications system or (optionally) to the ground system directly. MCP clients include wayside interface units, on-board computers, and track forces terminals. The RF segment operates at 4800 bits per second in the 900 MHZ radio band.

ATCS Specification 250 defines the message formats and data dictionaries necessary to standardize information transfer over the data communications system.

3.1.3 Locomotive System

The function of the locomotive system is to provide automatic location tracking and reporting, predictive enforcement of speed and authority limits, automated transmission of movement authorities, and switch monitor and control information via the data communications system. The locomotive equipment required to provide these level 30 capabilities is shown in Figure 3-4.

The locomotive equipment required to provide the level 20 functions of automated transmission of movement authorities and switch monitor and control is shown in Figure 3-5. Level 10 ATCS does not require on-board locomotive ATCS equipment. The 300 series specifications address ATCS locomotive system requirements. ATCS Specification 153 addresses locomotive on-board computer software requirements for level 30 locomotives, and for level 30 locomotives operating at level 20.

The Association of American Railroads' Task Force on Locomotive Systems Integration (LSI) has the mission to "develop a practical approach to the integration of the new electronic and mechanical components on locomotives" (per Minutes of Locomotive Systems Integration Committee Briefing to Locomotive Suppliers, September 5, 1991, Montreal, Quebec, dated September 11, 1991). An architecture to achieve this mission has evolved in the LSI Specifications which describe multiple configurations of electronic and mechanical components in a locomotive cab. LSI Configuration 1, described in the LSI Architecture Specification, shows

how an ATCS on-board computer (OBC) fits into the LSI architecture. As a variant to LSI Configuration 1, the ATCS OBC can be used as the interface to the brake sensors and penalty brake. In this alternate configuration, defined for retrofitting ATCS into non-LSI locomotives, the ATCS OBC takes the position of the Intelligent Brake Controller as shown in LSI Configuration 1. Reference the LSI Specifications for further detail on the LSI configurations.

3.1.4 Field Systems

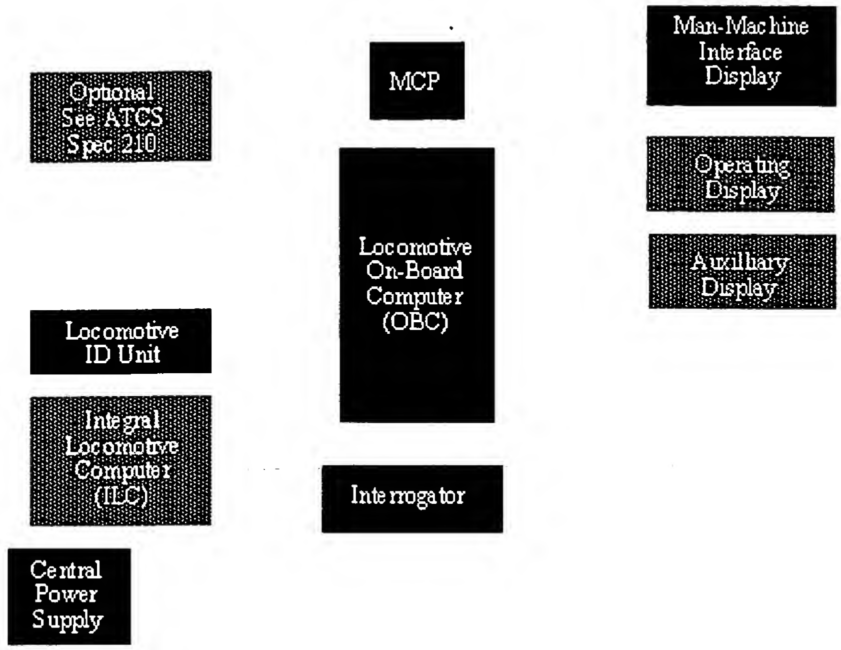
The primary function of the ATCS Field System is to provide remote monitoring and control of wayside devices by the dispatching system, locomotives and track forces. An ATCS Field System is comprised of a Wayside Interface Unit (WIU) and an MCP (see Figure 3-6). The WIU provides the interface between wayside devices and the MCP. Up to 30 wayside devices can be connected to the ATCS Communications Systems via a single WIU and MCP. Wayside devices include power- and hand-operated switches, railway crossings at grade, train defect detectors and track integrity indicators. ATCS Specification 155 and the 500 series specifications address ATCS field system requirements.

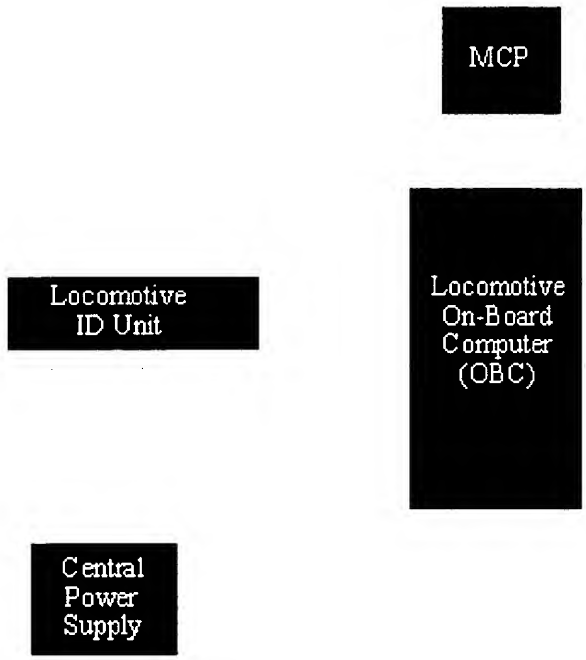
Existing code line systems can be replaced with the use of the ATCS data communications system and code line protocol converters (see Figure 3-7), which would translate code messages into ATCS messages and vice versa.

3.1.5 Work Vehicle System

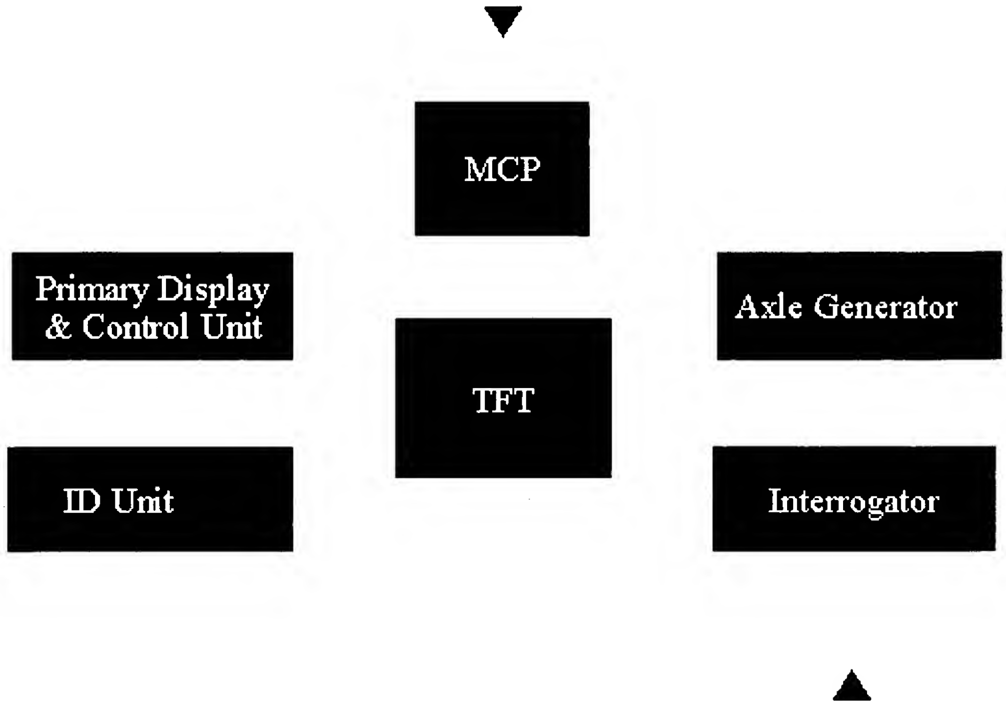
The primary function of the work vehicle system is to provide the capability for a track maintenance foreman to communicate with the Central Dispatch System and other vehicles via the data communications system. The system is designed to support various data input and output functions including switch monitoring and control; requesting, securing and releasing authority for track occupancy; requesting and receiving slow orders for designated mileage limits; transmitting slow order requirements to the central dispatch system; transmitting work reports to the central dispatch system; releasing slow orders; and requesting and receiving advisories. The work vehicle equipment required to provide level 20 capabilities is shown in Figure 3-8.

The work vehicle equipment required to provide these level 20 capabilities and the level 30 capabilities of automatic location tracking and reporting is also shown in Figure 3-8. ATCS Specifications 156 and 600 address ATCS Work Vehicle system requirements.


Optional
See ATCS
Spec 210
MCP
Man-Machine
Interface
Display
Operating
Display
Auxiliary
Display
Locomotive
On-Board
Computer
(OBC)
Locomotive
ID Unit
Integral
Locomotive
Computer
(ILC)
Interrogator
Central
Power
Supply


MCP
Locomotive ID Unit
Locomotive On-Board Computer (OBC)
Central Power Supply

MCP



3.1.6 System-Wide Considerations

3.1.6.1 Environment

Advanced Train Control Systems equipment will be subjected to a rather diverse set of environments, depending upon the nature and location of the equipment. ATCS Specification 110 provides a central repository for descriptions of environmental conditions for vehicle interiors (cab and non-cab), vehicle exteriors (body and truck mounted), wayside outdoors, wayside bungalows and instrument cases, wayside control rooms, computer rooms, and road beds. Each ATCS device specification will refer the reader to appropriate sections of ATCS Specification 110.

3.1.6.2 Packaging

One of the goals of ATCS is the development of a set of standardized, modular train control devices. To further this goal, each ATCS component (device) specification contains information on physical (*e.g.*, size, mounting) requirements for that component.

3.1.6.3 Software

The ATCS system is highly dependent upon software. The extreme importance of proper software design to system safety demands that certain assurances be made by the ATCS supplier to the railroad purchaser. ATCS Specification 130 contains a set of standard practices

and guidelines for Software Quality Assurance. Some or all of these practices and guidelines will be required by the purchasing railroad; in fact, the roads are encouraged to specify their own quality assurance procedures, as well. Detailed requirements for OBC, CDC, WIU, and TFT software are identified in ATCS Specifications 153, 154, 155, and 156, respectively.

3.2 SYSTEM OPERATING REQUIREMENTS

System logic specifications (also known as Control Flow Specifications) contain a detailed functional description of how ATCS controls rail traffic. The control flows shall be construed as part of the specification for each ATCS component. Adherence to these control flows is as important to interoperability as adherence to the communication protocols and transponder specifications.

The Control Flow Specifications for the On-board Computer, Central Dispatch Computer, Wayside Interface Unit, and Track Forces Terminal are contained in ATCS Specifications 153, 154, 155, and 156, respectively. These specifications, which contain detailed functional requirements, are written in machinable code (Ada-syntax Program Design Language).

ATCS SYSTEM ARCHITECTURE

4.0 QUALITY ASSURANCE

Recommendations for software quality assurance procedures throughout the ATCS life-cycle are contained in ATCS Specification 130. Recommended practices for safety and systems assurance are contained in Specification 140.

ATCS SYSTEM ARCHITECTURE

Appendix A - Glossary

This appendix contains a summary of some of the terms, abbreviations and acronyms used in ATCS specifications.

AAR - Association of American Railroads

ACK - Acknowledgement

ADDR - Address

ATCS - Advanced Train Control System

ATSO - ATCS Technical Support Organization

BCP - Base Communications Package

Boundary - The furthest reaches of a single Movement Authority, Track Condition Notice or Track Work Protection

BTIM - Base Time Entity

BU - Basic Unit

BWEMA - Bidirectional Work Equipment Movement Authority

CC - Cluster Controller

CCB - Configuration Control Board

CDC - Central Dispatch Computer

CDR - Critical Design Review

CDU - Control Display Unit (on locomotive)

CDS - Corporate Data System

CFR - Code of Federal Regulations

CHAR - Characteristics

CI - Configuration Item

CM - Configuration Management

CMC - Central Management Computer

CMP - Configuration Management Plan

CMS - Code Management System

COMM - Communications

CP - Control Point

CRC - Cyclic Redundancy Check

CSC - Central Safety Computer

CSDC - Component Specification Drafting Committee

CSHA - Code-Level Software Hazard Analysis

CTC - Centralized Traffic Control

CTL - Controlled, Controllable

DB - Data Base

DCU - Display and Control Unit

DDAT - Dispatch System Database Manager

DDHA - Detailed Design Hazard Analysis

DEMH - Dispatch System Emergency Handler

DEMP - Dispatch System Designated Employee

DHEL - Dispatch System Health/Status Monitor

Display Horizon - See Horizon

DIST - Distance

DLOC - Dispatch System Location Monitor

DMAH - Dispatch System Authority Handler

DMAN, DMNB, C - Dispatcher

DMIS - Dispatch System Management Information System

DMMI - Dispatch System Man Machine Interface

DPAC - Dispatch System Pacing Manager

DPSK - Differential Phase Shift Keying

DTIM - Dispatch System Time Manager

DTRK - Dispatch System Track Condition Notice and Track Work Protection Manager

DWAY - Dispatch System Wayside Manager

ECRW - Non-engineman train crew member

EIA - Electronic Industries Association

EMAN, EMNB, C - Engineman

EMERG - Emergency

EMI - Electromagnetic Interference

ESS - Environmental Stress Screening

ETU - End-of-Train Unit

FCC - Federal Communications Commission

FEA - Fault Effects Analysis

Feasibility - Check performed as part of validation to determine that

Check the requested/indicated function is possible given physical constraints

FEP - Front End Processor

FMAN, FMNB, C - Foreman

FMEA - Failure Mode Effects Analysis

FMECA - Failure Modes, Effects and Criticality Analysis

F^3 - Form, Fit, and Function

GALL - All ground network devices

GBCP - Ground Network Base Communications Package

GCC - Ground Cluster Controller

GFEP - Ground Front End Processor

GINT - Ground Network Initialization Entity, provides address tables to mobiles on request

GPS - Global Positioning System

GTIM - Ground Time Entity

HDLC - High-Level Data Link Control

HOL - Higher-Order Language

HW - Hardware

HWY - Highway

ID - Identification, Identifier

INIT - Initialize

IV&V - Independent Verification and Validation

JWA - Joint Work Authority (Bidirectional, multiple trains) also called WRARS, WRAPA

LDAT - Locomotive Database Manager

LEMH - Locomotive Emergency Handler

LHEL - Locomotive Health Monitor

Limits - The furthest reaches of a train's authority determined by concatenating all MAs held by the train

LLOC - Locomotive Location Monitor

LMAH - Locomotive Authority Manager

LMMI - Locomotive Man Machine Interface

LOC - Location

LOCO - Locomotive

LOI - Location of Interest

LPAC - Locomotive Pacing Manager

LRU - Line Replacement Unit

LTRK - Locomotive Track Condition Notice and Track Work Protection Manager

LWAY - Locomotive Wayside Device Manager

MA - Movement Authority

MCP - Mobile Communications Package

MDSP - All Displays onboard a locomotive

MDT - Mean Down Time

MIS - Management Information System

MMI - Man Machine Interface

MON - Monitor

MP - Milepost

MPH - Miles per hour

MSG - Message

MTBF - Mean Time Between Failures

NACK - Negative Acknowledgement

NX - Entry Exit (referring to a control point)

OBC,03,02 - Locomotive Onboard Computer (03 and 02 also indicate level 30 and level 20 operating capability, respectively)

OPER, OP - Operating, Operate

OS - Operating System

PA - Proceed Authority (Unidirectional, single train)

PAUX - Locomotive Auxiliary Terminal

PAXG - Locomotive Axle Generator

PDR - Preliminary Design Review

PDSP - Locomotive Display Terminal

PDTR - Locomotive Data Recorder

PEID - Locomotive Engineman ID

PETU - Locomotive End-of-train unit

PHA - Preliminary Hazard Analysis

PHL - Preliminary Hazard List

PINT - Locomotive Interrogator

Plausibility - Check performed as part of validation to determine that Check the requested/indicated function is reasonable

PMCP - Locomotive Mobile Communications Package

PPTR - Locomotive onboard printer

PRA - Proceed Restricted Authority (Unidirectional, for following train or other circumstances where restricted speed is desired). Also called PRARS

PRAPA - Proceed Restricted Authority/Protect Against

PRARS - Proceed Restricted Authority/Restricted Speed

PRAT - Production Reliability Acceptance Test Program

PSEN - Locomotive Sensor Control Unit

PSL - Project Support Library

PSLS - Locomotive Secondary Location System

PU/SO - Pick Up/Set Out

QA - Quality Assurance

Rogue - A train occupying ATCS-controlled track without holding an MA authorizing it to do so

RCVD - Received

REQ - Request

RF - Radio Frequency

RFP - Request for Proposal

RN - Revision Notice

RPT - Report

RQT - Reliability Qualification Test Program

RR - Railroad

RTC - Rail Traffic Control

RTS - Railway to specify

RU - Reader Unit

Safety Check - Check performed as part of validation to determine that the requested/indicated function will not cause loss of life or property damage

SBD - Safe Braking Distance, the distance within which a train can be brought to a stop (reliably) with a full service brake application

SBD1 - Safe Braking Distance plus 1 minute at current speed

SBD2 - Safe Braking Distance plus 2 minutes at current speed

SCA - Sneak Circuit Analysis

SCCSC - Safety-Critical Computer Software Components

SETF - Systems Engineering Task Force

SPR - System Problem Report

SRHA - Software Requirements Hazard Analysis

SSAPP - Safety and Systems Assurance Program Plan

SSPP - System Safety Program Plan

TBD - To Be Determined

TCN - Track Condition Notice

TDAT - Track Forces Terminal System Database Manager

TDD - Train Defect Detector (includes hotbox detectors, high/wide detectors, etc.)

TDHA - Top-Level Design Hazard Analysis

TEMH - TFT Emergency Handler

TF - Track Force, sometimes specifically Track Foreman

TFT - Track Forces Terminal

THEL - TFT Health Monitor

TLOC - TFT Location Manager

TMAH - TFT Authority Manager

TMMI - TFT Man Machine Interface

TOP - Track Occupancy Permit (Bidirectional, exclusive of trains, multiple work vehicles)

TRR - Track Forces Terminal TWP/TCN Manager

TRX - Transaction

TTRK - TFT Track Condition Notice and Track Work Protection Manager

TWAY - TFT Wayside Device Manager

TWP - Track Work Protection (controlled by track crew foreman)

UWEMA - Unidirectional Work Equipment Movement Authority

Validate - Perform a series of checks to determine whether it is appropriate to perform an indicated or requested function. May include plausibility, safety, and/or feasibility checks.

VS - Versus

WA - Work Authority (Bidirectional, exclusive)

WCTL - WIU Controllable Device Manager

WEMA - Work equipment movement authority, unidirectional or bidirectional exclusive authority granted to work equipment to move at speed along the train.

WEMH - WIU Emergency Handler

WFPA - Wait for Proceed Authority

WHEL - WIU Health Monitor

WHWY - WIU Highway Device Manager

WIND - Wayside Indicator

WIU - Wayside Interface Unit (ATCS component to interface to field device)

WMMI - WIU Man Machine Interface

WNCD - WIU Non-Controllable Device Manager

WO - Work Order

Working Train - A length assigned to the train by the CDC for the

Length purpose of determining the location of the rear of the train. This length is greater than the current best estimate of train length by a factor that reflects the confidence in the estimate (lower confidence means larger safety factor).

WRAPA - Work Restricted Authority/Protect Against

WRARS - Work Restricted Authority/Restricted Speed

WSIG - WIU Signals Manager

WTDD - Wayside Train Defect Detector (e.g., hotbox detector) Manager

WTLD - Wayside Train Length Measuring Device

WWHC - Wayside Wheel Counter

WXNG - Wayside Highway Crossing Device

XID - Exchange identity, a procedure performed between onboard devices to determine vehicle identity, and the physical ports to which various logical entities are connected.

This procedure is defined in Specification 200.

XPNDR,

XPONDER - Transponder

ATCS SYSTEM ARCHITECTURE

Appendix B - Conventions and Assumptions

This appendix contains a summary of some of the conventions and assumptions used in ATCS specifications.

The following assumptions are applicable to all control flows. ATCS Specifications 153-156 contain detailed descriptions of assumptions made in defining system logic.

Continuous track circuits are not necessarily installed. Powered switches and monitored wayside devices do have occupancy detection.

Where an application must respond to a message success or failure indication from the communications protocol stack, the requirement is defined in the Control Flow Specification.

Fixed route data is issued from one crew change point to the next.

Variable route data is loaded prior to reaching dispatcher boundary or on-line if changed *en route*.

MAs do not have explicit start times or end times associated with them.

The CDC is designed to allow it to be used to issue authorities only within the territory it controls. Furthermore, if more than one dispatcher is using a CDC, a dispatcher is only allowed to issue authorities within the territory he or she controls.

OBC/CDC/WIU/TFT are responsible for determining the proper addressee for messages they originate. The communications system provides transparent delivery.

ATCS does not provide broken rail protection.

Locomotive ID becomes known by the OBC at power up by the XID procedure described in ATCS Specification 200.

WIU and associated devices IDs are known to the WIU at startup by wiring in its harness, ROM, or other manufacturer defined mechanism.

The OBC will notify the engineman whenever enforcement is invoked, and whenever the train reverts to a lower operating level.

If a train reverts to a lower operating level due to a failure, it remains at that lower level for the remainder of its trip. If the train reverts to a lower operating level due to entry into a lower level territory, it may change back to the higher level upon entering higher level territory.

The following assumptions are applicable to the operation of trains over ATCS equipped wayside devices:

"Alerting" is a computer process which provides the functional equivalent of approach locking.

The OBC has wayside device data stored prior to operating over the device.

The device is within movement authority limits (the OBC shall not address any device outside the limits of movement authority).

Each command to set the position of a controllable device that is carried in an ATCS message contains the network address of the

vehicle on whose behalf the position is set, or a "wild card" address indicating multiple vehicles.

A wayside device shall send an emergency message to the vehicle and CDC when it is on alert and it deviates from its last command or becomes defective. A device shall send a non-emergency status message:

To the CDC when it is placed on alert or when its occupancy state changes.

To the CDC when its position changes or a malfunction is detected and it is not on alert.

Periodically to the vehicle while it is on alert.

A device will reject alert request(s) from other than the train/vehicle on whose behalf it was set (except if a "wild card" is used). A device shall be on alert for only one vehicle at a time, except where the device is an interlocking with independent routes, or a noncontrollable device protecting more than one track.

A device will not accept commands except from its master in a session. This implies field device maintainers must obtain a local session before taking a device off-line for maintenance.

A device will not accept an alert request for a route which is occupied. The device will respond to an alert when occupied with an alert request reject.

An OBC always interprets an alert request reject as a "not ok" status indication.

A device that is under local control for maintenance will reject alert requests.

The OBC will provide a mechanism for crew to manually cancel or re-initiate a device alert when stopped.

The data file of field devices in OBC will identify which, if any, along the route are ATCS equipped. If the device is not ATCS equipped, a message will be displayed to the engineman identifying the device, but the OBC will take no further action.

Equipped track forces operate over devices as does a Level 20 or Level 30 train. Unequipped track forces operate over devices as does a Level 10 train.